COAL AGE

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After Natural Gas—What?

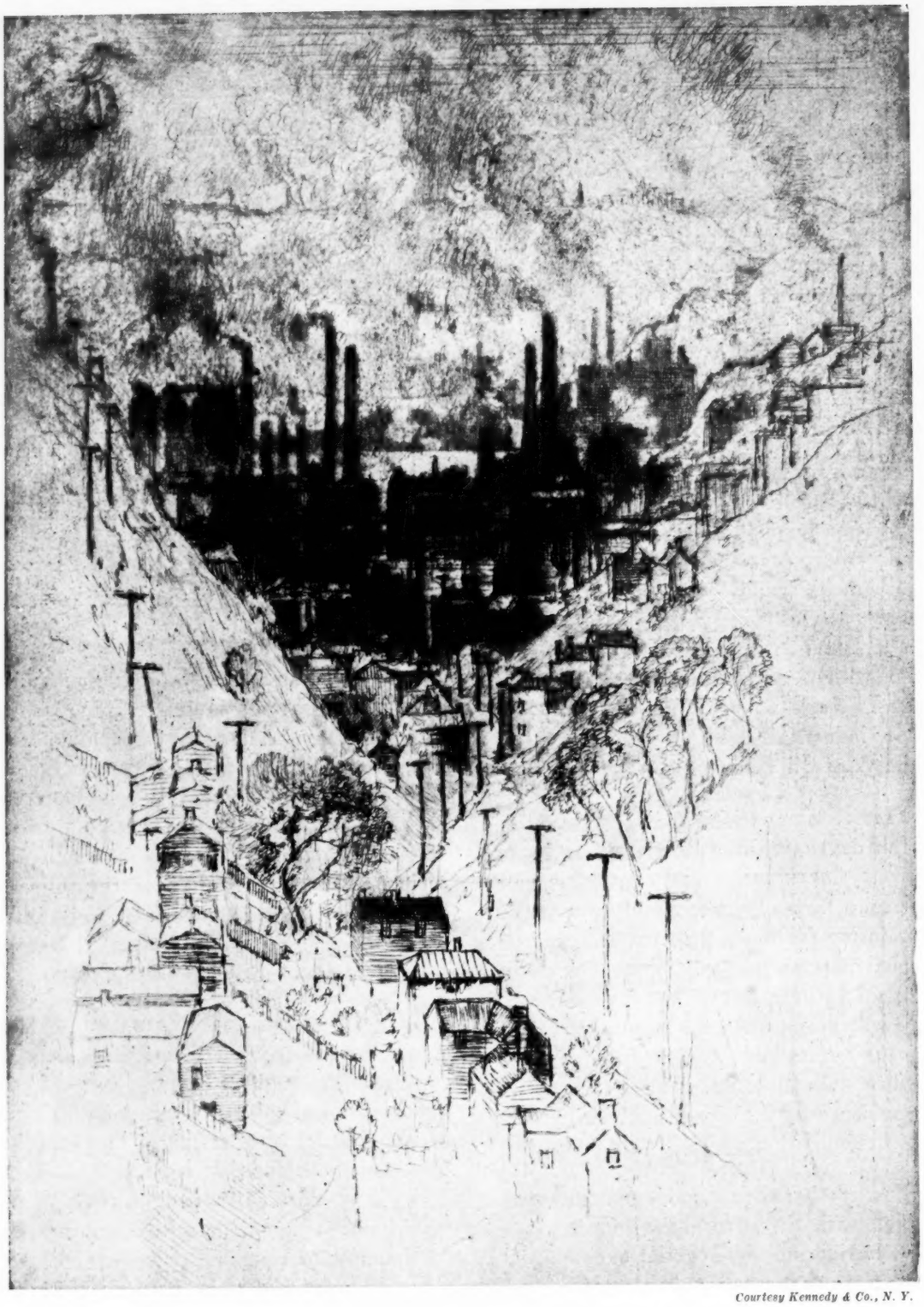
ACTIVITY of the natural-gas industry in reaching out for markets a few years ago considered too remote to serve sends shivers of apprehension through many coal men. Pipe lines already constructed, building, projected and dreamed, swing in a huge arc southeasterly from Wyoming through the Gulf States and north to the Middle Atlantic region, with feeders tapping the Middle West. There is no guarantee that any important industrial area in the South or Middle West will be untouched.

NEITHER fulmination nor lamentation can stay the development. Where natural gas offers superior inducements, consumers will desert solid fuels. What should concern the coal industry far more than the question of any immediate shrinkage in markets or volume of sales, therefore, is the position the industry will be in when the natural-gas supplies near exhaustion. The determination of that question will settle the permanence or impermanence of the losses inflicted by natural-gas competition.

ALREADY there are rumors that interests identified with the natural-gas industry are quietly buying up or negotiating for coal acreage against the day when they will have to send manufactured gas through their existing pipe lines or abandon their heavy investments in those transportation facilities. When that day comes, will the coal industry be a partner in the newer gas age or find itself at the mercy of the producers of artificial gas?

NATURAL-RESOURCE industries which are neither natural nor protected monopolies occupy a notoriously unfavorable position when they have no financial partnership in the processes of refinement and manufacture of their products. Copper-producing interests have found it economically sound and profitable to extend their influence into manufacturing. The captive mines of the railroad, the steel mill, and the coke oven are familiar examples of industrial and financial integration working from the opposite direction.

WITH the increasing importance of coal as a raw material for manufacturing, the need for this partnership is imperative if the coal industry is to enjoy its fair share of the profits from such processing. Too little has been done toward such co-ordination. True, it is a step which calls for both courage and vision, but to ignore it is to encourage the continuation of cannibalistic competition and elimination of the unfit by painfully slow assimilation.



Courtesy Kennedy & Co., N. Y.

Coal Fuels Industrial Pittsburgh

From an Etching by Joseph Pennell

RAILROAD VS. MINE PRACTICE

+ Coal Industry Can Learn Much From Carriers in Track Maintenance

By JOHN F. McCRYSTLE

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MINE HAULAGE requirements more and more are approximating those of common carrier systems. Increased shaft capacity, concentrated mechanical mining, and the constant drive to lower production costs are all contributing to a new conception of the importance of underground transportation. And yet the coal industry appears to have failed to take full advantage of the lessons learned in the allied railroad industry, largely because the mental approach has been different.

Too often trackage underground is considered to be in operating condition until derailments begin to occur; in other words, the theory is that the time to fix the track is when it starts to give trouble. Railroads, on the other hand, have discovered, through experience over a number of years, that the price of safety and continuity of operation is eternal vigilance. They know that only by making repairs as required can the track be kept in a high state of efficiency.

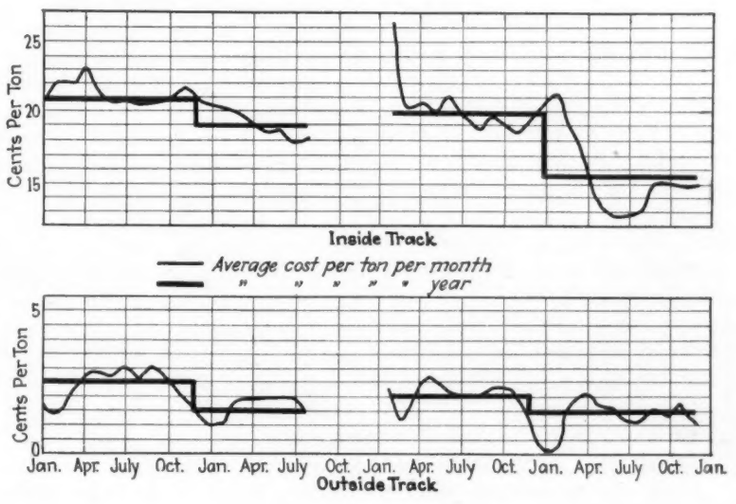
Contrast this forehanded method with too-common mine practice: A derailment of five loaded cars occurs on an underground slope. It requires five men one hour to rerail the cars. During this time five transportation units operating on the various levels off the slope and 60 miners dependent on this wing of the haulage system are forced to remain idle. Tracing the results toward the breaker, it is found that yet other delays occurred along the haulage route from the top of the slope to the shaft foot and along the transportation routes on the surface.

The foreman must have been aware that this track was in poor condition, for the track could not go bad suddenly. In his desire to keep his costs at a minimum, he put off the expenditure necessary to place the track in good operating condition. After this derailment, the tracklayers spent one day replacing ties which had been broken and repairing other damage to the track. Ultimately, the entire track will be fixed, piecemeal, as one section after another gives trouble.

This system of making repairs, much in vogue, calls for a track force which is continually on the alert, ready at a moment's notice to take tools and dash to the scene of the latest derailment. Instituted in the interest of economy, the system has actually proved expensive when delays, loss of production, and the time wasted by trackmen are considered. It requires a considerable part of the foreman's time to keep things moving, time which could be more advantageously spent in constructive thinking.

The foreman cannot be entirely blamed for his outlook—largely a heritage of the past, when the mule was almost the only means of transportation. A derailment in the days of the mule merely slowed up a slow system for a short time and, therefore, was much less costly than it is today. An hour's delay to a mule hauling two cars in a schedule of one hour for a round trip meant a loss of only two cars to the production for the day. But with the installa-

Fig. 1—Charts Showing Results of Railroad Maintenance Methods at a Group of Collieries



tion today of electric hoists and other transporting units, with a capacity of from sixty to one hundred cars per hour, it is evident that a single derailment is costly.

This enlargement of the consequences of derailments has served to fix the attention of alert mining officials on the desirability and economy of increasing expenditures for improving mine track. In their approach to the problem some have adopted as a criterion the methods and equipment used by the railroad companies and seek to adapt these to mining conditions.

Much good has been accomplished, both in the adoption of standards of equipment and in the missionary work of introducing railroad methods. These methods have been applied successfully and with little friction in installing and maintenance of tracks on the surface, where the work could be given adequate supervision. The result has been a general improvement, with a reduction of costs. Railroads have found that a unit varying from six to eight men, with a boss, can handle the needed material; that each man can be given adequate supervision, and that the boss can be held accountable for the work accomplished.

IN mine transportation the same measure of success has not been achieved. The chief deterrent has been the difference in the number of men in the respective maintenance units or track gangs. Underground, the labor unit consists of two men, a tracklayer and helper, the former being paid a higher rate per day than the latter. Adequate supervision cannot be given so small a unit, largely because each is expected to take care of approximately two miles of track. A boss of four units, or eight men, would be required to walk eight miles to visit the jobs under way only once each day. Little time is left for supervision of the individual units, which, therefore, are left on their own resources to a great extent. As a result the work accomplished varies greatly with the individual.

Several factors led to the adoption of the small labor unit for track work underground. Of greatest moment, perhaps, was the fact that two men were able to handle all the track materials. The rails used, though usually the most awkward and heaviest of the materials handled, weighed only 16 to 25 lb. per yard. Thus the maximum weight

of rail lifted and carried was only 250 lb. But for the installation of 40- and 60-lb. rails, weighing 400 and 600 lb. respectively, for the accommodation of the heavier rolling stock introduced in recent years, more than two men are required. The two-man crew for main-line track work consequently is destined to disappear.

Another reason for the employment of only two men on each crew in earlier days was the lack of communication facilities. The distribution of tracklayers was made as widespread as possible, so that they could be reached with little delay in the event of a derailment. As the telephone is now installed in most modern mines, and, as progressive management is now alive to the necessity of constantly keeping the track in good condition if derailments are to be avoided, no logical reason remains for not using larger repair and maintenance units. This change, though, does not eliminate the necessity of keeping a few men in the vicinity of strategic points to take care of contingencies. But until such time as the majority of the force can be placed under close supervision, little will be accomplished toward improving the efficiency of the track workers.

How sharply track maintenance methods used in railroading differ from those employed in mining can be illustrated by reviewing the practices followed in the upkeep of a unit stretch of eight miles of rebuilt track under each system. Consider first the railroad system:

A track boss and seven men are delegated to the care of the eight miles of railroad track. During the first year this force will devote its time to keeping the track properly aligned. A few ties diseased before installation become rotted and will be spotted and renewed. From the pounding of the rolling stock, low joints will develop. These joints will be picked up and the angle bar joints tightened. If any rail becomes defective, it will be replaced. At the end of the first year, therefore, the track will be in as good operating condition as when laid, and no trouble will have been experienced. This procedure will be repeated year after year; work will be accomplished as planned and the cost evenly distributed over every year.

In the mine four crews of tracklayers, or eight men, will be placed on the eight miles of rebuilt mine track, with the understanding that they are not to be taken off this work except in an emergency. A month goes by. The tracklayers have been spending their time tightening joints and surfacing the road where the ballast is soft. During this period no derailments have occurred and the sub-foreman in charge ponders the necessity of keeping men on track which is not giving any trouble when so many other things under his charge require attention, such as ventilation, drainage, and timbering.

IN the following months he borrows one or two men from the track force each day to aid in other work. And as no derailments occur even then, he begins to consider the entire force as a potential source of supply for filling vacancies in other departments, until at the end of the year, although these men are still classified on the time book as tracklayers, they might more properly be rated as a miscellaneous gang.

This goes on over a period of years. In the third and fourth years, perhaps, due to derailments and the diminution of haulage speed required to prevent them, the tracklayers cannot be taken away from their work with impunity, for they are constantly needed for keeping the track in operating condition. No headway can be made toward improving the track, as approximately 35 per cent of the ties are rotted. The proportion is enlarged by damage to ties

caused by derailments. All joint bolts are loose and worn and should be replaced instead of being tightened. The rail is service-bent, due to neglect in aligning and surfacing, and a large expenditure would be required to straighten the waves and vertical kinks.

During the fifth and sixth years all the time of the tracklayers is spent in maintaining the tracks. Their duties have degenerated into a wild scramble from point to point as derailments occur. Then frequent requests are made of the higher officials by the sub-foreman for more track men.

This comparison of methods is not complete without a discussion of the relative life of wooden ties in the two services under consideration. The average life of an untreated standard-gage tie, based upon yearly renewals, has been found to be fifteen years. To compensate for the lost life of ties which became rotted and were removed from the standard-gage track during the first year, an equivalent number would have a life of 29 years. The number removed each year will gradually increase until after the eighteenth year a normal renewal of 6.6 per cent is made yearly. This normal renewal rate will be exceeded from the twelfth to the eighteenth year, as the majority of the ties have a life varying between these years.

An untreated narrow-gage tie on the same basis has an average life of five years underground. In mine service, obviously, a greater number of ties should be renewed per year to keep the track in good operating condition; but no additional labor will be involved, because the mine ties are smaller and will require fewer men to handle them.

Rails inadequately supported by decayed ties become fatigued, break, and are hurriedly spliced. Conditions rapidly become worse, as 30 per cent of the tracklayers' time is spent moving from place to place, 20 per cent in assisting the transportation force in placing cars back on the track, and the remaining 50 per cent on productive work. Little wonder that the force must be increased.

Only when the delays become so frequent that the flow of coal is seriously impeded is that increase granted. Even then the struggle is confined to holding the track *status quo*. This objective becomes increasingly difficult. A stretch of bad ties will allow the rails to spread; cars are derailed and bounced over new ties, breaking them and pulling the spikes.

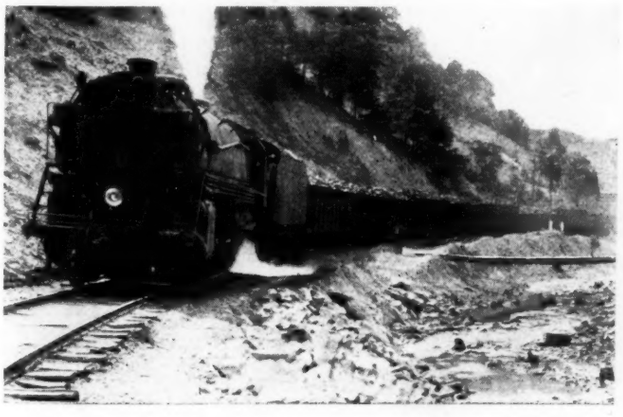
Because the tie is narrow it becomes spike-killed after the spikes have been re-driven about three times, and must be renewed long before it has given normal service. Badly broken rails are replaced, but, as the rotted ties do not furnish adequate support, the rails become fatigued very quickly and break. Thus the life of all material is shortened and the labor cost of renewal becomes inordinately high.

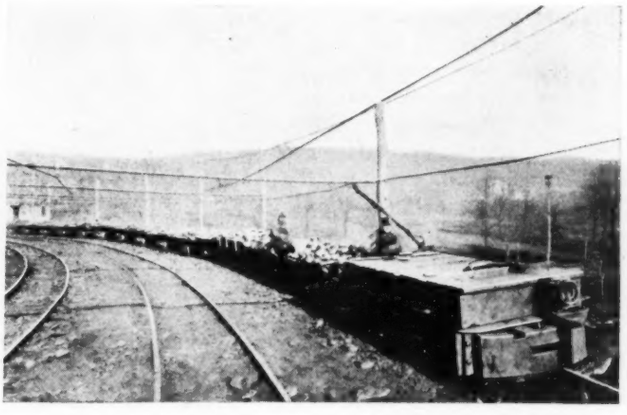
The track again is in such condition that the sub-foreman is pleased if he merely gets along from day to day. If it is suggested that additional money be spent to improve the track, his plea is that the cost of maintaining the track in the present condition is already high. He does not wish to burden his costs still further with improvements which can be deferred.

Only by patterning after the maintenance methods of the railroads can the coal mining industry remain constantly equipped to meet its underground transportation problems. The track crews must be increased in size and be attended constantly by a foreman. Instead of repairing the track after derailments occur, the new order will call for constant and continuing maintenance. In mining, as in railroading, the price of continuous transportation is eternal vigilance.

Attempts to apply railroad methods to underground track work sometimes fail because the sponsors do not convince the mine officials of the workability of the railroad plan before it is tried. As a rule, the men responsible for introducing the new methods have received their training entirely on the railroads. Though highly intelligent, they do not appreciate the difference in conditions between surface railroading and underground haulage. Nor have they taken into their confidence the mine officials, who themselves have built up a workable, if not a scientific, transportation system. Much can be learned from the mine officials on the pitfalls of underground haulage.

Simple maintenance records, reduced to the cost per ton and the cost per lineal foot of track maintained, should, of course, be kept and recorded by months on a chart showing the trend of these costs. Such records are likely to show surprisingly pleasing results, as they did in the case of one large company whose accomplishment is indicated by the graphs in Fig. 1. These graphs cover a period of years in the operation of a group of plants producing an average of 7,600,000 tons yearly under a railroad system of mine transportation. At a decrease of 5.7c. per ton in the inside track maintenance cost over the period, a saving of approximately $433,200 was effected. This lump saving does not include economies from the elimination of delays or from the decrease in the cost of maintaining rolling stock.





ECONOMIC LIFE

+ Of Mine Prolonged

By Conveyors in Thin Coal

By J. H. EDWARDS

Associate Editor, Coal Age

AFTER dumping coal for 41 years at the same tipple site at Ansted mine, Fayette County, W. Va., the Gauley Mountain Coal Co. has reached the point where the production of this mine must come largely from territory too thin for track-in-room operation with the present equipment of cars and locomotives. Service tests of conveyors during the last 18 months in a difficult part of the mine have indicated a section labor cost saving of 25 per cent as compared to former prohibitive costs in that section and 10 per cent as compared to the present cost in the rest of the mine.

General Manager R. H. Morris has become convinced that conveyor operation will make it possible to recover otherwise unprofitable coal in the Ansted mine and that a new mine which the company is opening in adjoining property should be worked with conveyors. Last year the Ansted mine established a record of 304 days' operation tipple time, and 301 days' railroad billing time. This would not have been possible if face preparation had been allowed to suffer.

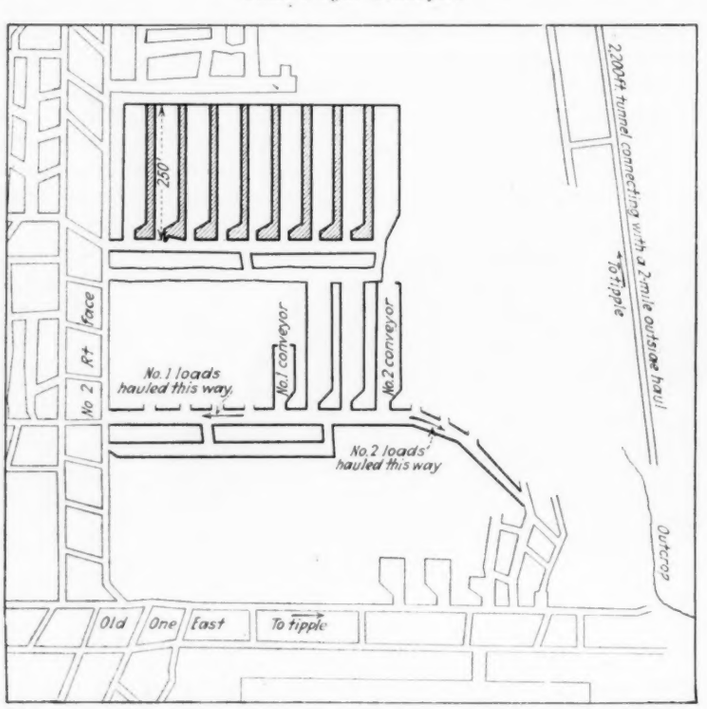
The first of two chain conveyor units was put into use in September, 1928; the second in May, 1929, and a shaker conveyor with duckbill loader was installed Jan. 1, 1930. The accompanying chart, Fig. 7, includes the section labor costs per ton and the total production of the two chain-flight conveyors. These were put into use in the "Old One East" section, which, as indicated by the chart, was shut down in February, 1926, because of a rapidly mounting cost. Beginning with the purchase of the first of the conveyor units, in September, 1928, there was an immediate reduction in labor cost for the section and the graph shows a fairly consistent advantage over the labor cost for the Turkey Creek section, from which the remainder of the mine production comes and in which the mining conditions are more favorable. As to grade that might affect conveyor operation the Ansted coal can be considered as lying practically horizontal.

Chain-flight conveyor work has been confined to an area 550x600 ft., 7½ acres, where about 40,000 tons is available. The coal is 36 to 40 in. thick, contains a thin parting which disappears in places, and the immediate roof stratum is 3 ft. of draw-slate which requires fairly close posting. The section is quite remote from the territory being worked by the old track-in-room hand-loading method. As indicated by the map, Fig. 1, it is near an outcrop at the distant end of a tunnel which connects with a two-mile outside main haul to the tipple.

Coal worked adjoining this section by the old method suffered a heavy yardage cost. Bottom was taken to the extent of 24 in. in entries and 12 to 14 in. in rooms. Conveyor work eliminates the room yardage.

The first work of the conveyors

Fig. 1—Heavy Lines Indicate Area of "Old One East," Section Developed and Mined With Chain-Flight Conveyors



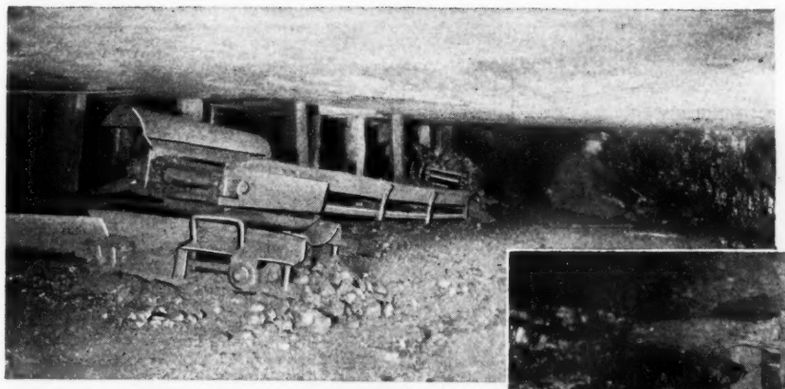


Fig. 2—Two 12-Ft. Conveyors in Series on a 40-Ft. Face in 36-In. Coal

Fig. 3—Conveyor Set-Up at the Room Neck. Here Can Be Seen the 14 In. of Coal Above the Drewslate. At This Point the Latter Is Much Thinner Than Average

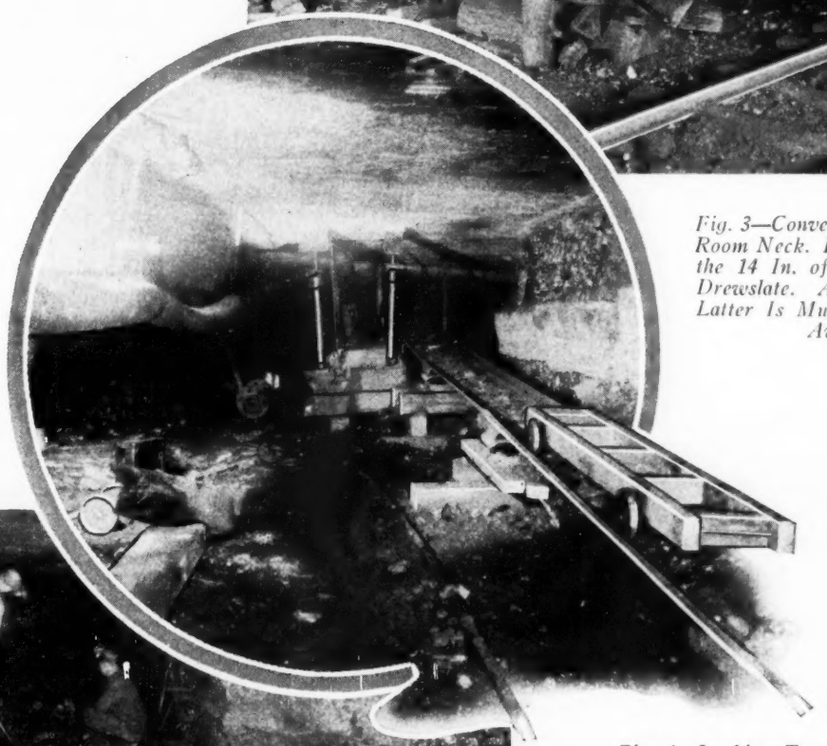


Fig. 4—Looking Toward the Drive and Discharge End of the Shaker

Fig. 5—One Man at the Control of the Duckbill and the Other Moving It Over With a Bar. Back of the Conveyor Pivot Jack at the Left Is a Shortwall Mining Machine

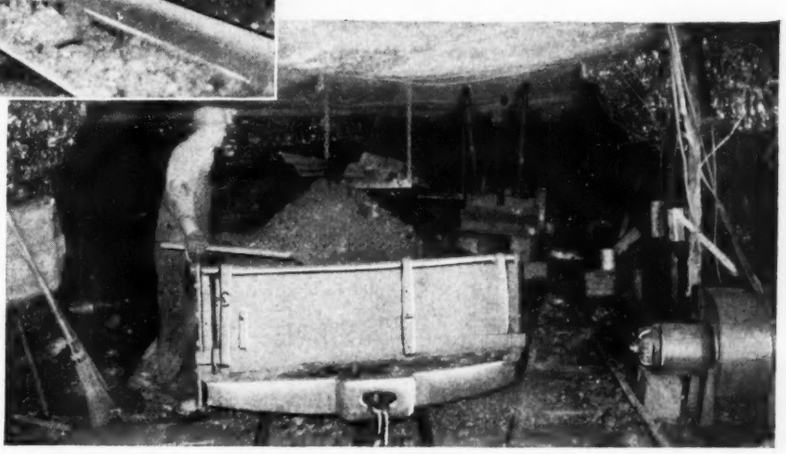


Fig. 6—As the Cars Are Loaded by the Shaker the Trip Is Moved Into the 45-Deg. Crosscut

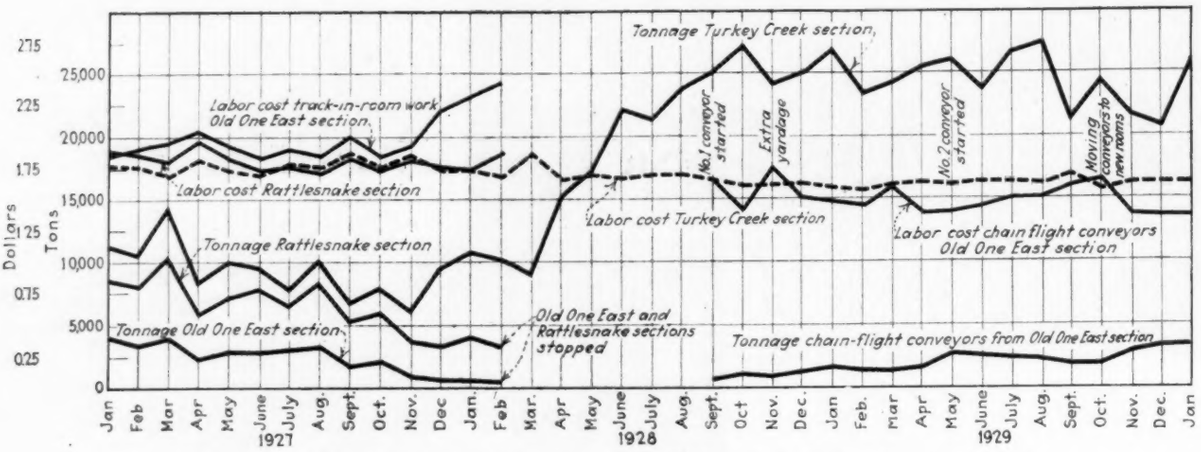


Fig. 7—Installation of Conveyors Transformed the Highest Cost Section Into the Lowest

was in driving the room headings and parallel aircourses 550 ft. The plan was to drive the headings 20 ft. wide, but the width had to be increased to 26 or 28 ft. as the minimum for convenient maneuvering of the shortwall mining machine and a 12-ft. face conveyor. After 288 ft. of heading had been driven the conveyor loading head was moved up to that point.

The first unit of chain-flight equipment represented an investment of $4,820, freight included. This original purchase consisted of a 275-ft. sectional main conveyor complete with 15-hp. 550-volt d.c. motor and speed reducer, two 12-ft. face conveyors, a 3-hp. blower, 275 ft. of 8-in. flexible tubing, a portable hoist with 6½-hp. motor and 300 ft. of ⅜-in. rope, electric coal drill with augers, and $135 worth of copper wire and cable.

The second unit of similar equipment brought the total investment to $9,378. This second purchase covered identical material except that it included but 100 ft. of main conveyor and included three face conveyors instead of two. The shortwall mining machines and one gathering locomotive, which have been at the mine for years, complete the section equipment.

PANS of the main conveyor are 16½ in. wide at the bottom and 5 ft. 11½ in. long. Flights are welded to the chains at every sixth pair of links, making a spacing of 16 in. Roller chains are used on the face conveyors and the flights are welded to every tenth pair of links, making a spacing of 14½ in. Both main and face conveyors were made by the Kanawha Manufacturing Co.

Rooms are driven 250 ft. deep, 40 to 50 ft. wide, and with 10- to 20-ft. pillars between, depending upon roof conditions and cover. The 7½-acre area has cover varying from 200 to 400 ft. Fee ownership makes it practicable to abandon room pillars. Props are left in place and the third or fourth room back begins to cave at the face.

Above the 3-ft. drawslate ceiling are the following strata in the order named: 14 in. coal, 4 ft. shale and coal in alternating thin veins, 2 ft. coal, 3 ft. shale, and a thick sandrock. The voids created by the breaking of the 13 to 14 ft. of top seems to take up the 36- to 40-in. coal extraction space to the extent that the thick sandrock either does not break or is eased down gradually.

The lifts of coal taken each cut at the room faces average 6 ft. 9 in., which means that adding a 5-ft. 11½-in. pan each time would not keep the conveyor close enough to the face. To compensate in a measure for the accumulating difference, a 3-ft. pan section is inserted and removed as space allows.

Four men per conveyor, eight men per shift, or sixteen per double-shift day are the only men working in the chain-flight conveyor section. An unusual feature is that these conveyor men do their own hauling to the main parting outside. They also hang trolley wire, do track work, timbering, cuttin, drilling, shooting, loading, and all other work in the section. In January of this year the sixteen men mined 3,290 tons, or 15.8 tons per man shift.

The regular working shift is 8 hours, but at times when coal is available for loading and the men wish to work longer they stay as long as 9 hours. The leader of each crew of four men is paid $5 and the others $4.68. In addition, each man is paid an extra hour for each three cars above a minimum requirement of 20 that the crew must load. The car loading averages about 2 tons.

Dismantling and moving the conveyor, loading two cuts by hand in the new room, and assembling the conveyor is accomplished in four shifts by the crew of four men. The rooms were necked with two cuts when the headings were driven. The fifth cut is the first one loaded over the conveyor. The driving of rooms with the two conveyors is timed so that one room is finishing about the time that the other is half way. With this scheme, 375 ft. of conveyor pan equipment suffices for working two 250-ft. rooms.

Normally one man works at the loading head, spotting and trimming cars. The other three work at the face, cutting, drilling, shooting, timbering, and loading. The car trimmers of the two units leave their jobs and form a motor crew of two to haul twenty loads 2,000 ft. to the sidetrack outside and bring back twenty empties, ten of which are left at each loading head. The other men of the two crews utilize the time that the conveyors are stopped by catching up with the odd jobs incident to the work.

AFTER 17 months' use and a production of 28,000 tons, the conveyor first purchased showed no serious wear, so it is contemplated that maintenance will be a small item.

Commenting on his experience with the conveyors, R. H. Massey, superintendent, said that the method makes it possible to work with top which is too frail for track-in-room mining. "You can set a prop every 2 ft. if necessary. Of course, it takes a lot of timber to work under such top, but using timber is cheaper than handling rock."

(Turn to page 150)

INDUSTRIAL ENGINEERING

+ Has Definite Place

In Coal Mining

By JAMES H. PIERCE

Stuart, James & Cooke, Inc.
New York City

IN THIS AGE of keenly competitive business, industry has been forced to take stock and eliminate as far as possible all wasteful practices. Commercial achievement now necessitates scientific planning and full knowledge of each item of production and distribution. Gone are the days when total cost, if sufficiently below realization figures, seemed to satisfy both directors and stockholders. Today, in order to maintain wages at the highest possible level, produce the highest quality product, and at the same time net a fair profit, it is necessary to analyze every phase of the business and to plan accordingly.

Many of our large industries have learned this lesson and have remedied their troubles. Unfortunately, others are lagging far behind in meeting present-day conditions. How often we see frantic efforts being made to recover lost profits, prestige, and business by indiscriminate shifting or discharge of personnel! Such procedure may be likened to the old-fashioned method of amputation for rheumatism. The balance sheets of these companies clearly show the results of such methods.

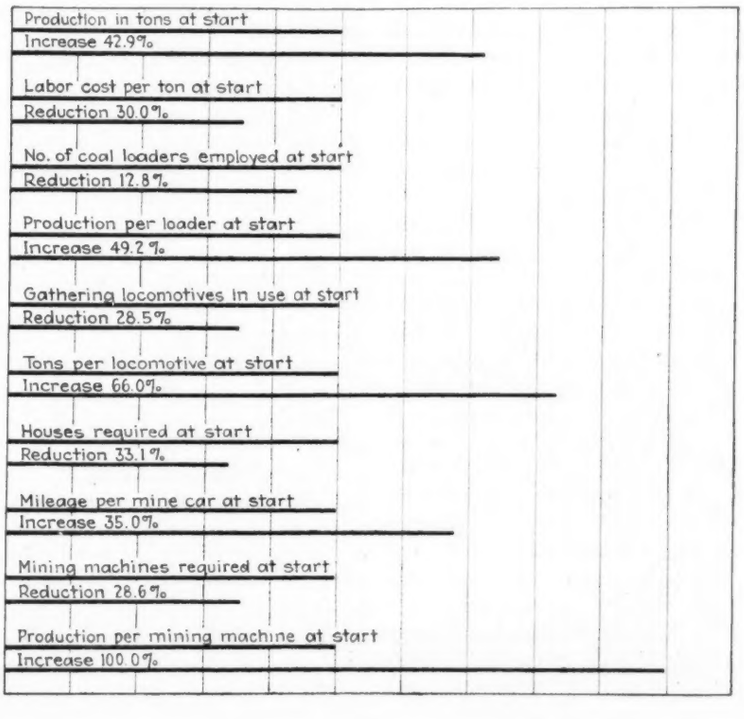
One of the large and most progressive American steel companies has for years been successfully applying scientific principles of management in its industrial plants. These include time studies and charts as a basis of plans and schedules. This company had been led to believe that the same methods could not be successfully applied to its coal mines, due to the multiplicity of factors entering into the operation of underground work and the constant changes taking place. Faced with the necessity of increasing production from its mines, however, the management decided to try to apply to its coal mines the same principles of scientific planning and scheduling, which had worked in its industrial division.

The company realized that, while the principles of management are very similar for all enterprises, specialized knowledge of a particular industry is necessary in order to gather the essential facts properly, to set up proper performance standards, and to interpret correctly the data gathered so that it can be intelligently co-ordinated into the basic principles underlying scientific management. With this thought in mind, the company management decided to approach the problem through a separate organization specializing in this particular class of work and to collaborate with that organization in the solution of the problem.

The result of this joint effort was that without capital expenditure and without change in wage schedules, startling results in increased production, lowered operating costs, housing conditions, and better relations with workmen were effected. These gains are pictured graphically in the accompanying chart.

It was early realized that a program, to be really effective, had to

Fig. 1—Six Months' Achievements in Industrial Engineering at a Captive Mine Operation



be comprehensive enough to include every phase of the mining operation. This involved a study of the aims of the management, daily tonnage requirements, coal reserves available, the distribution of these reserves, labor policies, housing and personnel, in addition to all the items of operation, such as cutting, shooting, loading, transportation, ventilation, waste disposal, timbering, tipple operation, and power consumption, together with a careful analysis of piece-rate schedules under different conditions to determine their equity. With the comprehensive knowledge of past performance thus gained, it was possible to gage the capabilities of directing personnel, men, and equipment as a basis of setting up performance schedules which should be attainable under all normal conditions.

FROM this point it was merely necessary to detail each phase of the operation and co-ordinate it with each other phase, and the basis of this detailed investigation was time studies. There is nothing new in the time-study idea, as it was developed long ago to a high state of efficiency by Taylor. When first introduced, however, the purpose of time-study was essentially to increase the productivity of the individual worker up to the limit of his physical capacity. Modern management directs its time studies with the view of increasing the workers' productivity by eliminating the waste motions in the directing personnel in faulty planning and in all those elements which render service to the worker, so that he automatically becomes more efficient even though he himself may not personally contribute knowingly to the improvement. Experience has repeatedly demonstrated that the worker almost invariably gets the spirit of the game and contributes to the improvement.

Executives who really take time to get close to their employees know that the employees study the management and its policies almost as closely as the management studies its employees. If an official is inefficient, the workmen sense this fact frequently before the management does. In like manner they recognize that when supplies are not delivered where and when needed, when voltage conditions are bad, or when sufficient cars are not delivered to load their coal promptly, these are all symptoms of poor management. Naturally, the workers feel that such management is responsible for curtailing their earning power, and they are responsive to efforts to promote efficiency along the lines indicated.

The major time studies in this particular case were grouped under three main divisions, although they were carried to lesser extent into other phases of the operation: (*a*) Coal loaders; (*b*) locomotives; (*c*) mining machines. Thirty-two miners were selected at random for the analysis in the time-study of loaders, and the following actual data were secured:

1. Average time actually engaged in loading coal per day.
2. Average time actually engaged in loading slate per day.
3. Average time setting props per day.
4. Average time consumed taking down slate per day.
5. Average time shooting per day.
6. Average time drilling per day.
7. Average time waiting on cars.
8. Average time waiting on cutting machines.

The last two items naturally were the subject of a further analysis when the time-study work was carried over to the machine and motor crews. No attempt is made in this article to go into details on the time consumed in each operation, because, naturally, this will vary with each individual miner, and the results, when correlated, only served to bring out the relative efficiency of each workman, and to establish averages of performance. The real vital information obtained was that the average lost time over which the miner had no control was 31 per cent of his total time. In other words, he was doing effective work only 69 per cent of his time. The highest efficiency found was 89 and the lowest 40 per cent. Here, then, was a real point of weakness to attack. It offered a real opportunity to increase production and at the same time increase the earnings of the employees, if means could be found to give the face worker better service.

The locomotive survey was started by analyzing the motormen's reports for a specified period to determine the average number of loaded and empty cars handled per day, and also to make a preliminary classification and average the delays of each locomotive. The average performance was as follows:

Locomotive	Average Number of Empties Per Day	Average Number of Loads Handled Per Day
No. 2	64	56
No. 6	97	97
No. 9	50	56
No. 4	93	103
No. 5	85	90
No. 8	175	200
No. 3	82	95
Average	92	99

The average delays per locomotive per day were found to be as follows: Waiting on orders, 5 minutes; blocked by other locomotives, 25 minutes; wrecks, 26 minutes; waiting on empties, 19 minutes; repairs, 5 minutes; waiting on wireman, 1 minute; power off, 2 minutes.

A man was then placed on each locomotive to make an intensive time-study of its complete running cycle and to record the time duration and reason for each delay. Each locomotive was studied for six working days and a complete record was made of time consumed in each operation of the locomotive between terminals, placing empties, gathering loads, switching loads, and switching slate. The delay record showed the time waiting for empties, off-track delays, interference by other motors, no power, sanding, waiting on tipple, switching and coupling cars, and waiting for orders. The number of empties and loaded cars supplied

> Scientific management is as applicable to the processes of coal mining as it is to the work of the factory. Fundamentals are the same. But the successful application of those basic principles calls for a high degree of specialization grounded upon a thorough understanding of the Taylor philosophy, an intimate knowledge of the coal-mining industry and a keen appreciation of the dominant human equation. There is more to scientific management than a stop-watch.

each day were recorded and the number of locomotive trips.

When the record for each locomotive had been compiled, the time figured for each element of its work was computed on a percentage basis as a measure of its comparative efficiency. Many other items of smaller delays were recorded on each individual motor sheet, but they were for the most part too small to have any bearing on the comparative results and were recorded only in the hope of eliminating special delays on individual motors.

The study of the performance record of the seven locomotives showed a maximum of 107 empties hauled per day per locomotive and a minimum of 73 empty cars; a maximum of 112 loads per day and a minimum of 81. The maximum number of trips per locomotive per day was 10.5 and the minimum, 8.

Based on this study, it was found that 30 per cent of the effective work of locomotives was lost by avoidable delays or that they were working at only 70 per cent efficiency.

Here, naturally, the facts developed carried investigation into power supply, trackage conditions, tipple operation, and all other elements which had a bearing on the performance of the locomotives, in order that corrective measures could be applied to eliminate delays.

The mining machines apparently were well adapted for the particular coal they were cutting and the studies made on each machine were in the main to determine the avoidable delays. Work such as traveling, cutting, loading and unloading, changing bits, oiling, and cable splicing were regarded as useful work, while delays by motor, lack of power, waiting for track, failure to have places ready, etc., were regarded as avoidable delays. On this basis, 42 per cent of the useful time of the machines was being wasted and they were rated at 58 per cent efficiency.

IT must again be noted that the delays may have been attributable to some other element, such as the motors or improper trackage, but it was only by rating each group separately that the real facts were developed, and the source of the trouble was intelligently attacked.

Mining men are too prone to feel that their particular mine would not show such results as are herein indicated. As a matter of fact, the mine described is unusually efficient as measured by the average mine that has come under the writer's observation. There is a certain smug satisfaction in feeling that things are run as well as they can be run, but progressive business men know that we are in a changing period, and that yesterday's standards will not survive the test of present-day competition. Much greater satisfaction is bound to arise to one who has the courage to believe that there is room for improvement and acts accordingly. The whole history of the coal business, unfortunately, indicates that there has been little progress toward this frame of mind.

Ordinarily, it is easy to obviate delays when pointed out by such an intensive study. This is particularly true as regards faulty track and poor power distribution, but what of the delays caused by improperly planned mining systems, faulty distribution of men, unbalanced distribution of mining equipment? At this point it becomes apparent that time studies are seen to be only a detail in the greater problems involved, and it is at this point that managerial planning experience and skill takes up the task.

To assist in co-ordinating the various elements and in properly applying corrective measures with the data secured, a map known as a tonnage map was developed. Experience had shown that while most coal-mining companies had made projections for developing their property with varying degrees of skill, it was a rare thing for such plans to be made on a scientific basis covering the labor factor involved in development work for coal extraction. The map developed was simply a skeleton map of the mine with single lines indicating tracks being used from the tipple to the various working faces.

On this map was entered the check number of the loader in each working place and opposite the check number the tons of coal, as shown by the tipple sheet, were recorded daily. This gave a graphic picture of coal-loading performance and sources of current production, and from it could be checked the daily and accumulative performance of each loader, and by comparing this performance with another loader in the same general area, relative loading efficiency was established. In many cases the individual who failed to produce a normal tonnage was found to be at fault, but where a group of men in a certain section showed sub-normal results, it indicated that responsibility rested upon some outside source through failure to render proper service to this group. The map was useful also as a current record to show whether the really important places were being worked regularly, and brought to the attention of the management any failure to rapidly and consistently develop certain entries that had definite need of schedules projected.

THE tonnage map was further useful in checking the performance of locomotives. By adding the tonnages shown opposite each check number in a given haulage area, the resultant figure represented the tons hauled by the locomotives for that day. Assuming a fair turn in distribution of cars is made and a substantial number of the men in any area were loading a satisfactory tonnage, it was an indication that ample cars were being supplied to that district. When that condition was repeatedly shown, the repetition was clear proof of the

JAMES H. PIERCE

The author of this article on the application of industrial engineering to coal-mine operation brings to his study a wide experience in the coal-mining industry. Born in the anthracite region in 1887 and educated at Girard College and Lehigh University, Mr. Pierce began his practical mining work as a transitman for the Lehigh Valley Coal Co. in 1910. A year later he was district engineer of the Maryland division of the Consolidation Coal Co. Another twelve months passed and he became general superintendent of the Paint Creek Collieries Co. Mr. Pierce returned to the anthracite region in 1915 to take the general superintendency of the East Bear Ridge Collieries, and in 1919 was made assistant to the president of the Buck Run Coal Co. A few years ago he resigned as chief operating executive of the Thorne-Neale interests to join the staff of Stuart, James & Cooke, Inc., and was sent to Europe as consulting engineer. He is now a member of that firm.

advisability of adding more loaders in this particular district in order to utilize the maximum haulage efficiency of the locomotive. Conversely, if the map indicated uniform loading in a district, but the average was less than the determined schedule, that was a signal that that district was not being supplied with proper service of some kind.

THE map was useful also in checking up on local miscellaneous labor performance and showed the relationship between the number of tons produced in a certain district and the amount of track, wire, and equipment being maintained on one hand, and the company men required to service this tonnage.

It was also found that the quite usual policy of permitting loaders within reasonable limits to select their working places, results in their unsuitable distribution as to haulage units. When loaders are plentiful, fair results can be obtained in this manner, but it usually requires excessive expenditure on the part of the company to serve the loaders well and get a maximum tonnage per man-day. Under the new system, loaders were placed in balanced groups so as to get the proper relation between all units.

Haulage, loading, and cutting are so closely integrated that no change can be made in either without studying its effect on each of the other units. When the loading groups had been arranged satisfactorily, the locomotive schedules were worked out to serve each group, and at the same time to avoid interference with any other haulage unit. Cutting-machine schedules also were drawn up in accordance with the new loader groups and standards of performance were worked out, having due regard to all of the various elements required for servicing the cutting machines.

Ample supervision was provided for each district, and labor and material costs were worked out on a district basis. Under this plan each foreman automatically went into competition with the foremen in other districts and a healthy spirit of competition was developed which produced excellent results. Having in mind the total tonnage requirements, the production schedule in each district was worked out and the development schedules of that district adjusted to the new tonnage requirements. A careful power study was made showing the voltage in all districts and the mine was completely sectionalized so as to produce the best results in each district.

The readjustment of the cutting, loading, and hauling schedules provided a balanced operation with a uniform flow of coal, and the immediate effect of this was to effect a considerable saving in tipple labor.

A number of interesting facts were found which could not be determined from ordinary visual inspection or from the cost sheets. For example, in the case of two adjacent rooms with similar mining conditions and with coal transported over the same route, the labor cost for the coal from one of these rooms was 20c. a ton less than the cost of coal from the adjoining room. Between different sections of the mine under the same management, and with the same general class of labor and similar working conditions, there was found a variation in labor amounting to 26c. per ton. In some cases, with the facts available, the corrective measures to be applied were quite simple and easy to see.

IN the majority of cases, however, the corrective measures required co-ordination with other factors. For example, when the tipple was in operation, coal was being prepared at times at an hourly rate almost double the average hourly production rate. This unco-ordinated schedule made it necessary to have a tipple crew sufficient to take care of the peak load. It was not practicable at once to reduce the speed of the tipple operation and thus reduce the number of men required, because to do so would delay the motor crews when, as frequently happened, two or more were at the tipple at the same time. Before reducing the tipple speed and reducing the labor force, it was necessary to reorganize the haulage system in such a way that trains of mine cars would reach the tipple at intervals sufficient to permit the preceding trip to be dumped and the empty cars coupled in trains ready to be returned to the mine without delay to more crews.

An interesting study was made of the houses, and in analyzing the returns from these the gage used was the labor obtained from each house as measured in gross returns. This indicated that some of the houses were occupied by men whose productive ability was below the standard and gave an indication of those men who were occupying better quarters than was their worth to the company in comparison with others.

The reduction in equipment and houses required shows that not only could this surplus in capital expenditure have been initially saved, but the expense of attendant labor and maintenance as well. The power-consuming equipment was reduced, thus leveling off peak power demand, reducing connected horsepower, and improving transmission-line service.

INCREASING the capacity of the loader not only added to his pay envelope, thereby making him a more satisfied employee, but it attracted a better type of loader, which gave a still higher percentage of efficiency.

Company officials recognized at the outset that rigid plans, no matter how good as of that day, would be of little value because of the constantly changing conditions in the mines. It was decided, therefore, as an essential part of the program to build the organization in a way to meet necessary changes. Arrangements were made, therefore, for periodic visits to the property so that the original schedules developed could be followed up, and also to adjust these schedules if changing conditions warranted a change in the original program.

As summarized in Fig. 1, within a period of six months production was increased 42.9 per cent; labor costs were reduced 30 per cent; the number of loaders employed dropped 12.8 per cent, while the production per loader increased 49.2 per cent. There was a reduction of 28.5 per cent in use of gathering locomotives with a 66 per cent increase in tonnage per locomotive. Housing requirements were cut 33.1 per cent. Mileage per mine car increased 35 per cent. The number of mining machines in use was cut 28.6 per cent and the production per mining machine was doubled!

The results showed conclusively that such a course was fully justified and has been profitable. It was demonstrated again and again that the individual man, whether he was a member of the management or a laborer, wanted to do his part. Men like to do a good day's work and go home with the satisfaction of having accomplished something. This spirit was given ample opportunity through sound management, and the constant improvement when the new plans were put into effect, was reflected in quality, production, cost and safety.

FORCED VENTILATION

+ Raises Safe Rating of Mine Hoists

By CARL LEE

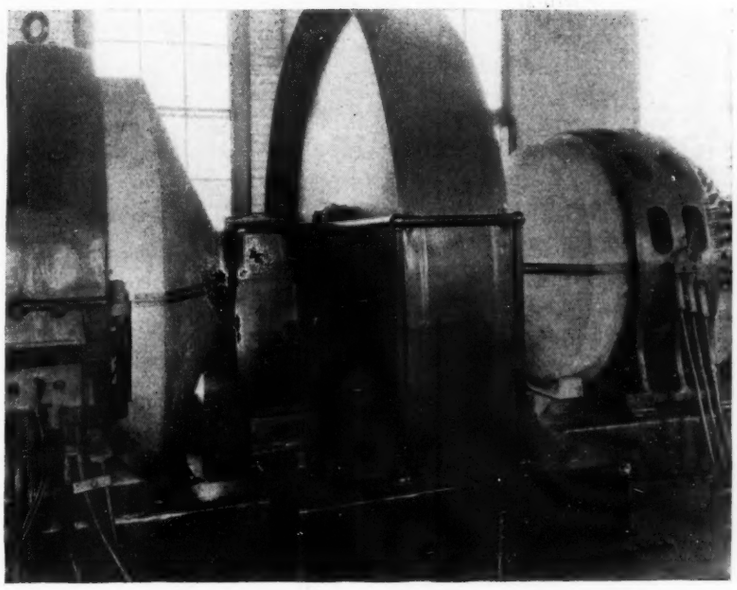
Electrical Engineer
Peabody Coal Co.
Chicago

IF THE DEMAND for coal mined through a shaft grows greatly beyond the original capacity of the plant, to get more tonnage it is necessary to speed up the hoisting cycle. The desired end may be accomplished either by replacing the existing hoisting equipment with a larger unit or by increasing the rope speed and simultaneously cutting down the caging interval.

To replace the hoisting equipment is costly and out of the question in the case of a plant that has been in operation for a good many years. On the other hand, there are limits to which the shaft capacity can be increased merely by shortening the hoist cycle. For relatively short periods the cages or skips can be raised and lowered at a speed above the designed rate, but if the overspeed is maintained for a protracted period, the temperature rise of the hoisting equipment will go beyond the safe limit and electrical troubles will develop. To permit speeding up the installed hoisting equipment without danger of overheating, it is necessary to increase the cooling facilities by forced ventilation.

In 1914 the Peabody Coal Co. installed duplicate electric shaft hoists, one each at Kincaid mines No. 7 and No. 8, operating in the No. 6 seam, at Tovey, Ill. These units were of the Ilgner Ward-Leonard type, the hoist motors being rated 675 hp., 550 volts, 65 r.p.m., and the flywheel set at 550 kw., 695 r.p.m. They were designed to hoist 1,000 mine cars in seven hours, or 143 per hour, through a vertical distance of 385 ft. As the cars were to hold 4 tons, the designed capacity of the plant was 4,000 tons in seven hours. The rating of the hoists was based on a rise of 40 deg. C. above a room temperature of 25 deg. C.

In the original installation natural circulation was depended upon for cooling all equipment, but because of high room temperature, changes were made so that the atmosphere in the hoist room was changed through ventilation pits under the units, air circulation being effected by a 4-ft. fan and a 5-hp. drive.



Hood on Flywheel Set for Forced Ventilation

The original induction motor on the flywheel set was rated 450 hp. The capacity of the plant was increased from time to time until the induction motor was running at too high a temperature. It was then replaced by a 550-hp. motor. Again the speed of the hoist was increased and the caging time decreased.

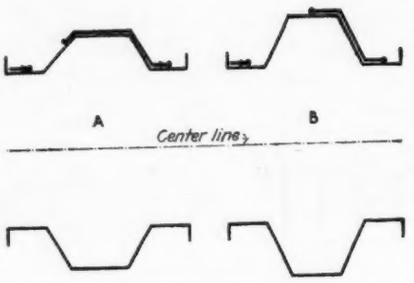
This increase in the hoist speed was accomplished by the installation of a new drum on each hoist. As originally designed, the hoists were equipped with a drum of the double cylindro-conical type, as indicated at *A* in the accompanying sketch, the large diameter being 9 ft. and the small diameter 6 ft. In the operation of a drum of this design, it will be noted, the empty cage going down starts on a diameter less than the maximum; also that the load coming up travels from maximum diameter to a reduced diameter at the stopping point.

A study of the cycle on this old drum indicated that an improvement could be made by using a larger drum, proportioned as indicated at *B*. This design permits the maximum effect of the empty cage going down to be used in the initial acceleration. Likewise it gives the maximum retarding effect when approaching the dump.

Approximately 10 per cent increase in capacity was obtained by the change in the drums. Operating with the new drums and reduced caging time, the capacity was increased until,

in the summer months, the temperature of the hoist was reaching a dangerous point. It was decided then to install forced ventilation, not only for the hoist motor but for the flywheel set.

A blower supplying 7,000 cu.ft. of air per minute, driven by a 7½-hp. motor, was installed to cool the hoist motor. The spider of the armature is closed by a hood of galvanized sheeting. The air enters the bottom of the motor housing on one side, is forced along the armature and between the poles and leaves the motor through the top half of the opposite side, the lower half being inclosed by a hood. The blower is installed in the basement of the hoist house and the air is conducted by a duct of galvanized sheeting which reaches the hoist room through the ventilation pit under the hoist motor. A similar arrangement has been provided for the ventilation of the generator and of the induction motor in the flywheel set, each by individual blowers.



Old (A) and New (B) Drum Design for Increasing Hoist Speed

Before the installation of the blowers the temperature in some parts of the hoist motor reached as high as 110 deg. C. at a room temperature of approximately 43 deg. C., representing a rise of 67 deg. C. After the blowers were installed the maximum temperature was about 80 deg. C. at a room temperature of 43 deg. C., a rise of only 37 deg. C.

Some benefit was obtained from the ventilation of the flywheel set, but the improvement does not compare with that in the hoist motor. The flywheel set does not offer as great an opportunity for improvement, since it runs continuously and gets the full benefit of natural ventilation during the caging or light-load periods. The hoist motor, however, runs at full speed only about half the time. So with the ventilation blower on this unit in operation continuously, the effect of external cooling on the hoist motor is more marked than on the flywheel set.

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Economic Life of Mine Prolonged By Conveyors in Thin Seams

(Continued from page 144)

Assuming the average labor cost in the more favorable Turkey Creek section for the three months prior to February of this year as 100 per cent (see Fig. 7), the chain-flight conveyor cost for the same period was 80.3 per cent and the cost of all coal mined by this new method up to Dec. 1, 1929, development of the entire section included, was 89 per cent.

The shaker conveyor with duckbill loader was put into use driving entry through a section where the coal recovery by that method is but 28 in. and where below this coal there is a seam of slate 4 to 44 in. thick and also a vein of coal that is wasted. Some of the rather thick slate appears along the right rib (Fig. 4.) It is the coal above this parting that is recovered. At the face, about 200 ft. farther on (Fig. 5), the wasted portion consists of two thinner partings and two veins of coal.

After being undercut, the wasted coal and rock is shot down and loaded with the duckbill; then, after careful cleaning of the place, the top bench of coal is shot down and loaded with the same equipment.

With the present equipment of pans, 299 ft. of straight heading and a 45-deg. crosscut to a parallel heading are being driven from each setting of the electric drive. This drive is a "Cosco," but is fitted with a 30-hp. Sullivan mining-machine motor which the coal company had on hand. No trouble is encountered in getting the shaker to operate satisfactorily around the curve entering the 45-deg. crosscut. In the conveyor trough, shown at the right in Fig. 4, is the buggy or trolley used to transport pans and other material along the conveyor to the face.

Already the experience with conveyors at Ansted mine has demonstrated that it is possible to make a reduction of labor cost which will justify the investment for converting to conveyor operation. Whether the same would be true if the equipment of cars and locomotives were of the extra-low-height types now available is still a debated question among officials at the mine.

Coming: A Trip to Wildwood

Every so often a mining development is started which captures the imagination of the coal fraternity. For several months, wherever and whenever bituminous coal operating men have foregathered, "Wildwood" has been a word to conjure with. "Have you heard, have you seen, did you know they were doing this and that at Wildwood?" runs the comment.

This new operation of the Butler Consolidated Coal Co., located a few miles from Pittsburgh, wins attention for several reasons. To begin with, it is the first property in the country planned and laid out from the start for complete mechanization. Many companies have adopted mechanization and changed existing systems to conform with it, but Wildwood is built as a mechanized mine.

Among unusual features are the hoisting of coal on a belt up a steep slope, the mounting of all equipment on wheels and a layout that favors machine loading and reduces the areas under operation. On top, coal will be cleaned by the pneumo-gravity system.

Editors of *Coal Age* have been watching the progress of this development for months. And the first complete story of the Wildwood operation will appear in an early issue.

COAL CLASSIFICATION

+ Shall Use or Quality Control?

By R. DAWSON HALL

Engineering Editor, Coal Age

GRADUALLY it becomes evident that the use-classification of coal is too impermanent to have many adherents. Almost any coal can be used for any purpose if the public finds that by reason of location the ideal fuel cannot be obtained at a reasonable price. And again, such local and adventitious matters as ash or sulphur percentage and friability seem to determine the acceptability of a fuel for water-gas generators, which work about equally well with any hard, clean coal, whether anthracite or high volatile. Any coal can be used for domestic or steam consumption.

So inherent quality rather than use seems likely to regulate classifications; but how many classes shall be made, and on what basis shall they be differentiated? Having fewer classes simplifies matters, but it makes more difficult the position of the man or region whose coal is just on the edge of attaining a better class but just fails to attain it. Shall chemical characteristics or heat values govern, or shall physical condition also be considered?

In the last two years, it was brought out at the meeting on the subject held in New York City, Feb. 17, as part of the annual gathering of the American Institute of Mining and Metallurgical Engineers, much effort has been exerted to find an acceptable scheme of coal classification. Marius R. Campbell, geologist, U. S. Geological Survey, despairs of making any such tabulation based solely on moisture or solely on volatile matter. At some points he would employ still other methods of differentiation, such as the tendency to slack at the limits where high-moisture hydrobituminous passes into low-moisture hydrobituminous, and the presence or absence of recementation of friable coals where the low-volatile bituminous coal passes into anthracite.

Mr. Campbell recognizes that there will be a difficulty in fixing limits between classes and the classes he gives are tentative and subject to negotiation. In certain instances some predominating physical quality may have to be considered of greater importance than proximate analysis in the placement of the coal. (See Table I.)

This government geologist prefers to make a classification of coal on its inherent qualities and not on the basis of the uses to which the various coals may be put, because usage is a variable factor which changes with our needs and technique. He recognizes that it would be better if some one characteristic, such as moisture, might be used throughout the classification. But the moisture varies in only small percentages in bituminous coals, and consequently he uses it for differentiation only at the two ends of the scale; namely, to classify the brown coals and hydrobituminous at one end, and the graphite or meta-anthracites at the other.

But in the case of the coal from Hanna, Wyo.; Mount Harris, Colo., and Gallup, N. M., the differentiation by moisture content fails to separate coals which slack from a coal like that at Superior, Wyo., which does not slack but nevertheless has a larger moisture content. They are all three so low in moisture as to be entitled to a place in the low-moisture hydrobituminous, the division that holds the Illinois coals, according to Mr. Campbell's classification, but their physical

*Table I—Marius R. Campbell's Suggested Classification of Coal**

Group	Class	Characteristics		Location of Typical Deposits
		Definite	Distinguishing	
Browncoal	A Peat	80 to 90 per cent moisture	Unconsolidated vegetal tissues	
	B German brown coal			Germany
	C Lignite	Over 27 per cent moisture	Brown in color. Slacks, oxidizes and ignites readily on exposure to weather	Dakotas, Montana, Colorado, Gulf Coastal Plain in Texas, Arkansas and Mississippi.
Hydrobituminous	A High-Moisture	27-13.5 per cent moisture	Color passing from brown to black. Slacks on exposure to weather	Wyoming, Montana, Colorado, Washington, Utah.
	B Low-moisture	13.5 per cent moisture to 5 or 6 per cent	Coal does not slack appreciably	Illinois
Bituminous	A High-Volatile	Fuel ratio less or equal to 2.5	Little degradation in handling or shipment. Hard coals	
	B Low-Volatile	Fuel ratio between 2.5 and 5.5 Friable coals		
Anthracite	A High-Volatile	Recemented coal. Fuel ratio below 9.5. Not so hard as anthracite of class B, but harder than bituminous of class B	For 10 or 15 min. burns with yellow flame	Pennsylvania, Virginia, Arkansas
	B Low-Volatile	Fuel ratio between 9.5 and 76.0		Pennsylvania.
	C Meta-Anthracite	Moisture high		Rhode Island and Massachusetts.

*This table was not a part of Mr. Campbell's paper. The first two columns are quoted word for word from his article but the other three are merely a tabulated presentation of statements made in his address. Some of these were offered by Mr. Campbell without any declaration of finality.

characteristics proclaim them as high-moisture hydrobituminous.

In the division between low-volatile bituminous and high-volatile anthracite there is an overlap. The highest rank coal in the Pocahontas region is that found near Welch, W. Va., and it has a maximum fuel ratio of 5.37, but this coal is not recemented and therefore is not one of the group of anthracite coals, though its fuel ratio is greater than that of some of the coals of Montgomery and Pulaski counties in Virginia. Consequently when the precise line is drawn the division at this point must be made on friability rather than on fuel ratio.

Meta-anthracite, the final member in the series, has been termed graphitic or superanthracite. "It has clearly passed beyond the stage of a straight anthracite," said Mr. Campbell, "and it has the peculiar characteristic of a moisture of from 13 to 14 per cent. This is not extraneous moisture, as has been proved by G. C. McFarlane, who found the moisture content of a coal in direct contact with a large basalt sill to be 11.1 per cent, though the same coal at a greater distance from the sill is a normal low-moisture anthracite.

Outside of the classification are coals of cannel, splint, and boghead nature. They cannot be placed except in classifications of their own. The low-volatile bituminous and the anthracitic coals have been subjected to so much heat that although canneloid structure may be observed, the volatile matter having been driven off, it will be possible to put these coals in a classification with those of more normal origin. In the high-volatile bituminous and less developed coal this cannot be done. Too much of the volatile matter has been retained by the cannel. Strange to say, the low-moisture hydrobituminous coals have never, so far as Mr. Campbell has noted, been found to be of a cannelly nature, though the occurrence of such coals might be anticipated.

Dr. David White, U. S. Geological Survey, said that the former weighting or loading of the rocks with sedimentary deposits would not suffice as a criterion for classification, nor would age of deposition. He believed the lignites could be classified according to heat values or percentages of fixed carbon rather than by moisture content.

George H. Ashley, State Geologist of Pennsylvania, who initiated the present interest in classification, seems to have realized the natural anxiety of the coal operator whose coal is just on the shady side of a class division and who finds the discrimination unfavorable to the sale of his product. The more divisions, the less harrowing will be the situation of anyone whose coal is just below the lower border line of some better class. Dr. Ashley therefore offered a classification different from that he presented to the Coal Mining Institute of America, and which caused the present study. This classification is based mainly on the fixed carbon which, he shows in Fig. 2 travels across the chart like a shooting star. All the other constituents are undesirable factors for classification. Oxygen, moisture, and elemental carbon in some parts of their course are but little affected by the rank of the coal. The curve of volatile matter curves back on itself, and hydrogen has such small values as to give only a questionable means of determination. All these analyses are plotted on a selected standard-ash or on an ash-free basis.

So Dr. Ashley accepts the proposal of H. J. Rose, assistant chief chemist, the Koppers Co. Laboratories, and suggests that "coal 70" be the manner of expressing a coal having 70 per cent of fixed carbon on the ash-free or standard-ash basis. But realizing that this may not suffice, he suggests that the percentage of ash can be added. If this is, say, 6 per cent, he designates the fuel "coal 70·6." But he suggests it may be desirable to give the "actual" fixed carbon percentage, say 65. Then the coal will be designated "coal 65/70." A further suggestion is that the number of British thermal units be divided by 100, and the figure used after the designation of the coal as part of that designation, so that a coal with 70 per cent of fixed carbon on a standard-ash basis, having 6 per cent ash and having an actual or guaranteed thermal value of 14,000 B.t.u., could be described as "coal 70·6·140."

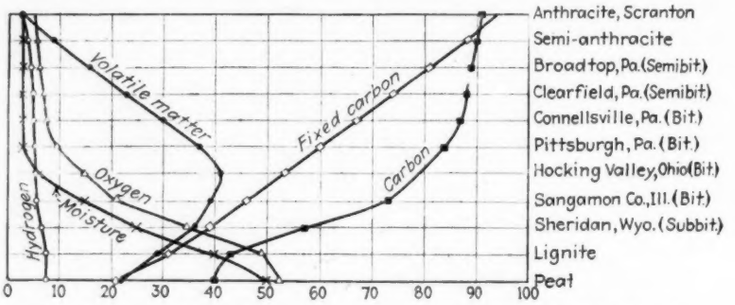


Fig. 2—Shows How Analytic Constituents Vary for a Selected Series of Coals—Superanthracite Omitted

Fig. 1—Larger Steps in Process of Devolatilization of Coal

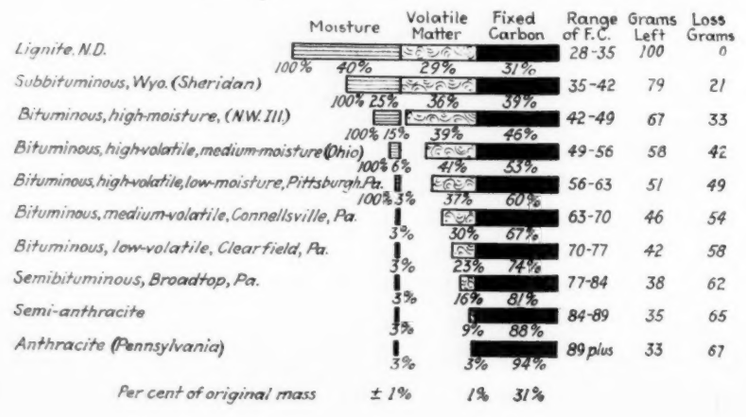


Fig. 1 shows the larger steps in the process of devolatilization of coal. The fixed carbon is regarded as constant, unaffected by the temperatures to which the coal has been exposed. The quantity of volatile matter and moisture corresponding to that fixed carbon nucleus is shown. Finally, it is stated that of 100 grams of original lignite substance, only 33 grams are left in anthracite, 31 of these are fixed carbon as at first, 1 is volatile matter, as against 29 grams and 1 is moisture, as against 40 grams.

In the absence of R. E. Gilmore, superintendent, Fuel Research Laboratories, Department of Mines, Canada, Mr. Rose presented Mr. Gilmore's paper on the "Status of Coal Classification in Canada." Mr. Gilmore described the two principal classifications in the Dominion, that

Table II—Stansfield and Sutherland (1929) Classification

Rank of Coal	Percentage of Volatile Matter in Pure Raw Coal	Calorific Value on Pure Raw Coal Basis, B.t.u. per pound
Anthracite	?– 8	14,000–16,000
Semi-anthracite	8–12	14,000–16,000
Upper bituminous	12–20	14,000–16,000
Middle bituminous	20–(30–45)	14,000–16,000
Lower bituminous	30–50	12,750–(14,000–16,000)
Upper sub-bituminous	.....	11,750–12,750
Middle sub-bituminous	.....	9,000–11,750
Lower sub-bituminous	.....	7,000– 9,000
Lignite and brown coal	.....	? – ?

of Dowling and that of Stansfield and Sutherland. (See Table II.) Mr. Dowling added half the percentage of volatile matter to the fixed carbon, assuming that half to be effective fuel, and divided that result by the moisture percentage increased by the other half of the volatile matter, describing the quantity as the "split volatile ratio."

The bituminous coals are divided into "short-flame" and "long-flame," according as the volatile matter is below 20 or above that figure. The dividing line between the calorific values of these coals is placed at 12,700 B.t.u. per pound.

Mr. Gilmore's paper explained how bituminous coal, which is subject to tariff, is separated from anthracite and lignite and lignitic coals, which enter the Dominion free. Anthracite is defined as coal which has no coking properties and has a fuel ratio of 6 or more. The Scotch anthracites, with physical properties seemingly equally as good as certain of the hard Pennsylvania and Virginia anthracitic coals, are distinctly semi-anthracite as judged by fuel ratio. As for Welsh anthracites, the best quality, with 3 to 6 per cent ash and fair to good handling properties, have fuel ratios of 10 to 11 and higher, whereas a considerable part of the Welsh coal imported as anthracite falls appreciably below the fuel ratio line of 10, and in some cases is dangerously near the dividing line of 6.

Lignite and lignitic coals are defined as those grades of coal having on the air-dried basis not less than 6 per cent moisture content. To dry the coal it is crushed and laid in shallow layers at room temperature in an atmosphere of approximately 60 per cent humidity.

Mr. Rose, in introducing a paper by himself and J. J. S. Sebastian, said that many variations in charts had resulted from their authors choosing different classes of values as ordinates. He showed two well-known charts, one by S. W. Parr and one by W. T. Thom, to illustrate the difficulty. Mr. Rose then described his multibasic coal chart which is framed on the early Ralston studies of coal.

Illustrating his paper he showed charts exhibiting the changes when fresh-mined pulverized Pocahontas, Powellton, and Elkhorn seam coals were oxidized under laboratory conditions designed to produce changes similar to those occurring during coal storage. It was shown that the agglutinating or coking qualities of one of the coals actually improved at first as oxidation proceeded, though this was not characteristic of the others.

After the samples had lost all their agglutinating power, as tested by the Marshall-Bird method, the proximate and ultimate analyses and calorific values were still within 4 per cent of their original magnitude. As the value of coal for practical coking purposes is affected by oxidation long before its agglutinating power is completely destroyed and as allowance must be made for imperfections in sampling and analysis, slight oxidation may affect the practical coking value of coal before changes of composition can be detected with certainty.

David B. Reger, West Virginia State Geologist, urged that the consumers' needs be given primary consideration in determining a classification. For instance, the gas coals should be separated from those for domestic use. In short, the classification should be based on market needs. Dr. Ashley declared that uses fail to define coal closely, and Dr. White added that a use-classification would be of fleeting value if one could be constructed, because the uses of coal vary rapidly. For instance, coal without preliminary treatment may not continue to be used for domestic purposes. Dr. Campbell declared that the classification, when complete, must be permanent and not subject to change by reason of development in the technique of use. Dr. Alden, of Iowa, said that moisture was only one of the causes of slacking.

At the afternoon session, A. C. Fieldner, chief chemist, U. S. Bureau of Mines, presented his review of the methods of coal analysis with particular reference to classification and also his paper on the present status of ash corrections in coal analysis, in which latter he collaborated with W. A. Selvig, associate chemist, Pittsburgh Experiment Station, U. S. Bureau of Mines. He pointed out that the ash, as determined by ignition, is not the same, in either weight or composition, as the inorganic mineral matter in the coal. On ignition, many changes occur in the coal. Its shaly material loses water of hydration; its pyrite (FeS_2) is converted to ferric oxide (Fe_2O_3) with evolution of the sulphur as sulphur dioxide; possibly also more or less of the sulphur in the ash becomes fixed as calcium sulphate ($CaSO_4$), and the calcite ($CaCO_3$) decomposes to calcium oxide (CaO). The quantity of sulphur from pyrite which remains in the ash as calcium sulphate depends on the quantity of calcite and pyrite in the coal.

Prof. S. W. Parr, said Mr. Fieldner, defines unit coal as the pure coal substance considered altogether apart from extraneous or adventitious material which by accident may have been associated with the combustible organic substance of the coal. He proposes that the non-coal material *in* the coal, which is not the same as the non-coal material *derived* from the coal by burning, be calculated by adding the moisture and the ash together, adding thereto five-eighths of the sulphur and eight-hundredths of the difference between the ash and five-fourths of the sulphur.

Following others, Dr. Fieldner advocates the analysis of only the purest part of the coal, so as to rule out as far as possible the effect of the impurities. This can be done by using for test the float from a float-and-sink machine. Experiments have shown that the pure coal in the float portion and the pure coal in the sink portion are identical in rank.

THE article by Messrs. Fieldner and Selvig gives numerous observations as to the loss of moisture and carbon dioxide by carbonaceous shales when burned. Figures also are given on the moisture removed at 105 deg. C. From this it is deduced that the ash value should be increased by multiplying by 1.07. Parr's figure, as indicated above, is 1.08. Perhaps, the authors think, this is the preferable figure, because other volatile constituents, such as chlorides, may be removed. In fact, they think that even 1.10 may be the preferable factor.

A table also shows that samples of coal from Somerset County, Penn-

sylvania, had only 25, 27 and 29 per cent of their sulphur organic, that a sample from Clearfield County in the same state had 39 per cent of its sulphur in that form, and that a sample from Cambria County, in that state, had 53 per cent. At the other extreme a Westmoreland County (Pennsylvania) sample had 85 per cent of its sulphur organic and the sulphur in a sample of Pocahontas coal ran 88 per cent non-pyritic. As a result of the inquiry the authors would divide the sulphur percentage in half, as being usually about half organic and therefore not subject to reduction.

Mr. Fieldner also presented a paper by E. Stansfield and J. W. Sutherland, of the Scientific and Industrial Research Council of Alberta, Edmonton, Alta., on the determination of mineral matter in coal. The authors clean the coal in centrifuge cups with carbon tetrachloride and benzine as the floating medium. They dry the coal for about one-half hour in a current of natural gas or carbon dioxide, so that it will not oxidize when being dried. The final grinding is done by small porcelain ball mills from which the air is displaced by natural gas.

F. R. Wadleigh, New York City, briefly presented a commercial classification of coal, omitting reference to Southern coals and Pennsylvania anthracite. In this classification he included British, Belgian, French, German, Indian, and South African coals. Mr. Wadleigh merely described the classifications as recognized, reference being made to the seam names and localities, these being regarded by the consumer and coal trade as determinants of quality.

NORMAL coals were in the limelight till Reinhardt Thiessen, research chemist and microscopist, Pittsburgh Experiment Station, U. S. Bureau of Mines, discussed splint coal. According to Dr. Thiessen, this type of coal consists in the main of attritus, which is the general residue left from plants, plant products, and plant organs of all kinds when acted on by fungi, bacteria, actinomyces, low forms of animal life, such as insects and their larvas, crustacea, and worms, and by meterological influences. This contains not only degradation from wood and other carbohydrate tissues, spores and pollens, cuticles, resins, and waxes but opaque matter which in the most microscopically thin sections is either barely translucent and even wholly opaque. This is the material that abounds in splint coal. The British term splint, "hards," "dulls," or "durain"; the Germans designate it as *mattkohle* or *durit*, and the French, *houille matte*. When the opaque matter is streaked with bright anthraxylon bands—that is, woody material—the coal is termed by the Germans *streifenkohle*.

Two classes of opaque matter may be recognized: One having definite structure and the other almost without any, the plant matter being irregular and disorganized. Splint coals differ radically from ordinary humic coals in their dull gray color, granular consistency, great hardness, solidity, toughness, higher specific gravity, chemical composition, and behavior on chemical treatment. When ground on a glass plate with a fine abrasive, the surface thus ground becomes brown-black; when an attempt is made to polish it to a high degree it becomes dull gray black, but never acquires the high polish assumed by ordinary coals treated in this manner. Mr. Campbell believed the opaque material represented a particular plant or was its specific decomposition product. He said that he held that different kinds of coal were derived from different kinds of vegetation.

Articles were presented by E. W. Parker, director, Anthracite Bureau of Information, Philadelphia, Pa., describing commercially the different kinds of anthracite, and by H. M. Payne, consulting engineer, American Mining Congress, Washington, D. C., similarly outlining the various kinds of coal in the South and Southern Inland regions.

Anthracite, said H. G. Turner, assistant professor of geology, Lehigh University, Bethlehem, Pa., is nearly always laminated. The fact that the thickest and most widespread bed in the Pennsylvania anthracite region is largely of this nature has given rise to the statement so often found in literature that anthracite is not laminated. With the exception of much of this bed and a few restricted portions of other beds, all Pennsylvania anthracite is as fully laminated as bituminous coal.

IN Dr. Turner's paper it was said that mineral charcoal, or fusain, of the Forge Split of the Mammoth anthracite bed had an ash percentage of 1.3 and that the same product from the Freeport bituminous coal bed had an ash percentage of 18.1. This aroused some comment, J. R. Campbell, Koppers-Rhéolaveur Corporation, remarking that there were two kinds of fusain: a high- and a low-ash material. G. St. J. Perrott, superintendent, Pittsburgh Experiment Station, U. S. Bureau of Mines, added that some fusains had large impregnations of calcite and were quite hard, whereas others had only 5 or 6 per cent of ash and were relatively soft. Cannel, said Dr. Thiessen, may be of the splint, humic, or spore variety.

When fusain is mixed with coal and sand it increases the agglutinating power of the coal, but when mixed with coal and granular carbon, the agglutinating power is reduced. Professor Parr declared that in Illinois there was low-ash and high-ash fusain but that the infiltration was by pyritic sulphur rather than by calcite.

Gilbert Francklyn, fuel agent, Consolidated Gas Co. of New York City, stated the qualifications of a good gas coal as being those in Table III. Mr. Francklyn said that anthracite for water-gas generators should certainly not have more than 12 per cent ash. Sulphur should not exceed 1 per cent. Moisture is undesirable, but not generally excessive in anthracites. The fusing point in such coal usually exceeds 2,900 deg. F., which is high enough. The coal should be well sized and not disposed to break into fines.

Table III—Proximate Analysis of a Gas Coal

	Per Cent	
Moisture	2	High limit about 4 per cent
Volatile Matter	35	Low limit about 32 per cent
Fixed Carbon	57	
Ash	6	High limit about 8 per cent
	100	
Sulphur	0.9	High limit about 1.25 per cent
Fusion Point	2500 deg. F.	Low limit about 2,350 deg. F.

Coal must coke

Broken, egg or stove will serve, but stove may be too high in price. Smaller sizes, he said, do not give satisfactory results.

Bituminous coal for water-gas generators should be sized about 3x6 or 2x4 in., operators having differing opinions. The coal must be hard enough to keep its size until it reaches the point of combustion. The fusing point of the ash should be 2,600 deg. F. or higher. The ash should be in as low a percentage as possible and sulphur not over 1.25 per cent. High-volatile coals are preferred, probably because they are not friable. The quantity of volatile matter and the coking strength do not appear to be leading considerations.

All kinds of coal can be used in gas producers from anthracite to peat. High ash, low fusion and strong coking qualities tend to make an unequal fuel bed and are undesirable. High sulphur is likely to be accompanied by low fusion and to spoil the gas.

PENNSYLVANIA ASKS

+ Is Her Electrical Mining Equipment Safe?

By G. F. NEWMAN

Electrical Inspector
State of Pennsylvania
Uniontown, Pa.

AS ELECTRICITY is increasingly used it naturally becomes a growing hazard in mining operation. Many companies are installing electrical machinery of permissible types, with the purpose of reducing the explosion hazard, yet a number of instances have been found where such machinery has gotten out of condition, thus reducing the protection which its permissibility affords.

Recognizing that the real trouble consisted in the inability of the mine electrician to realize just what defects existed in his machinery, Walter H. Glasgow, Secretary of Mines of the State of Pennsylvania, appointed four practical electrical men on Oct. 22, 1928, to make an inspection of the permissible and closed-type electrical machinery in the gaseous mines of Pennsylvania, with the purpose of removing the hazards described. The electrical inspectors were practical men, lent by their employing companies for the special work to be performed. A week's training was given them by the U. S. Bureau of Mines, at Pittsburgh, Pa., before they entered on their duties.

As the gas hazard was the object in mind, the inspection of open-type equipment extended no further than to see that the machines were provided with adequate fuses, unless there were some obvious electrocution hazards which needed removal. Open-type machines of their very nature have explosive hazards, and no inspection can make them safe in the presence of gas, so inspection of such machines would serve no purpose.

State inspection of a permissible or flameproof machine covers the following elements: The trailing cable is examined to see that it is properly provided with fuses; to note the number and character of the splices; to see that the latter will hold; to ascertain that the cable is properly secured to the reel terminals, and that the clamp on the cable relieves the terminals of any strain.

Parallel conductor trailing cables are recommended in preference to concentric cables, because, due to their construction, they will dissipate the heat more readily, are not so difficult to splice and have been proved under test to be more efficient than the concentric type of cable.

Reel bearings are checked to see that they have not become excessively worn; the switch and fuse box are examined to note whether the leads between them are properly incased in conduit, to ascertain that the packing glands in the fuse box are properly packed and tight, and to see that the switch itself is in working order and that the fuse is properly loaded. The hand cable is inspected to see if it is adequately secured to the machine and that there are no terminal strains on it.

ONE at a time, the compartments are then opened. The controller compartment is examined to see if the fingers are in good condition and properly lubricated. The resistance compartment follows; its resistance is inspected to see if it is insulated from the frame of the machine and is free of jumpers. The motor compartment is then opened. Here the brushes and commutator are examined to see if they have become loose or dirty. This latter feature needs examination not only in this but in all compartments. While they are open the sealing surfaces are checked to see that they have a minimum width of one inch.

The machine is then reassembled. With a feeler gage a test is made for openings in excess of tolerances. So long as these openings do not exceed 0.004 in., no objection need be raised. If they are greater than that, the surface is checked with a scale and a feeler gage and ways are suggested of correcting the deficiency.

While the compartments are open, inspection is made to see if there are any unbottomed holes—that is, holes that are drilled through to the compartment. Such a hole would leave a passage for an explosion should a bolt, by some oversight, carelessness or loss, be omitted when the compartment is bolted into place. Wherever practicable, stud bolts are recommended for use in cover plates, because, being permanently screwed into the casting, they do not have to be disturbed when inspections are made. The nut is screwed on the exposed end of the bolt and gradually its threads and those of the bolt become stripped. When this happens, the bolt is removed from the casting and a new bolt is screwed into place. Such replacements, however, are so infrequent, as compared with the frequent removal of the compartment cover, that it can be effected without stripping the threads in the casting. If a tap bolt were used that had to be turned into and out of the casting every time an inspection was made, the casting threads would soon be worn out and a major repair would be necessary.

Cleanliness throughout the machine is always advocated, outside the compartments as well as inside them, for it reduces the fire hazard, increases the safety of operation and is conducive to economy. The electric inspectors advocate using vulcanizing machines to repair cables.

Missing covers on locomotives, old machine cables improperly insulated and strung in rooms for use as feeders to the regular cables for the machine, improper bonding, insufficient feed lines, air compressors for drilling coal with motors of the open

type, were among the unsatisfactory conditions found. For lack of satisfactory switches for controlling 550-volt current, many unsatisfactory arrangements have been improvised at coal mines.

The state law requires that all explosion-proof compartments shall be inspected once a week. Many companies are keeping records of inspections. Some provide a book like that prepared for the use of firebosses. In this record is entered a report of the inspection of each machine, which record is countersigned by the mine foreman and superintendent.

After making the inspection at each mine the inspector makes four reports, one as his own record, one for Harrisburg and two for the district inspector, who sends one to the operator with a letter. When the district inspector receives the report he uses his discretion as to whether the operator should be required to suspend the operation of the unit or mine until the faulty condition shall have been corrected. It is the practice to let the unit return to work as soon as reported safe, but the electrical inspector returns as soon as possible to assure himself of that fact.

Defects are rectified quite promptly. At the start of the work electricians seemed to lack instruction regarding their duties rather than will to execute them. The campaign was one of education rather than of fault-finding. The men who were responsible for the machinery were taken to the machine and defects were explained on the spot.

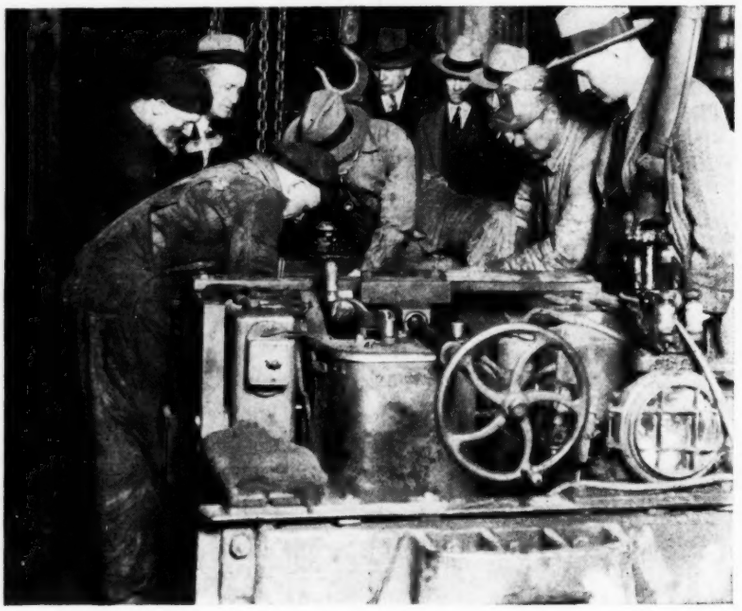
IN addition, the inspector checked underground transformer hazards, called attention to combustible material around switchboards, noted the grounding of switchboard frames and pumps and saw that these were properly protected with fuses and circuit breakers.

A second visit is now being made to the mines visited in the first inspection, and a most gratifying improvement is to be noted, proving that the work was well worth while. It is pleasing to report that the operators have found that compliance with the suggestions made have resulted not only in greater safety but also in greater efficiency of operation and in important power savings. Safety is rarely introduced without adding to the production of each unit and in lowering of the cost of operating it. Safety, productivity and economy go hand in hand.

Expert Opinion Aids Maintenance

FOUR to eight cents per ton covers the range of total labor and material maintenance costs for locomotives and mining machines at a large percentage of the bituminous coal mines. At many of those in the higher range that do not face especially difficult natural conditions, a reduction in this item of mine cost is an attractive possibility. The accompanying photographs show an interesting phase of the maintenance reduction effort by the Gauley Mountain Coal Co., Ansted, W. Va.

In both photographs, John S. Dean, maintenance expert of the renewal parts engineering department, Westinghouse Electric & Manufacturing Co., Homewood Works, is the central figure. While Mr. Dean was in the New River field, R. H. Morris, general manager of the coal company, induced him to make a knockdown inspection of a locomotive in the presence of the mechanics and to talk on his findings and on the general subject of maintenance to all of the mine officials that evening in the white employees' first-aid room, near the warehouse.



Pointing Out Faulty Maintenance

Mr. Dean is sitting in the center on the locomotive, Mr. Morris appears back over his shoulder, and W. I. Dalton, chief electrician, is second from the right, wearing a mine cap.

A Maintenance Get-Together in the Evening

Mr. Dean sits on the nail keg; E. K. Willis, purchasing agent, is at the extreme left; G. E. Hoover, chief engineer, is on the left end in the front row; and R. H. Morris is second from the right in the front row.

HELPFUL DUST

+ Is There Such a Thing?

ROCK DUST successfully removes the explosibility of coal dust. May not a silky dust like that of shale or clay or an alkaline dust like that of limestone counteract the harshness or acidity of a silica dust? Nothing aroused more interest in the ventilation sessions at the annual meeting of the American Institute of Mining and Metallurgical Engineers, in New York City, Feb. 19, than the declaration reported as having been made by Dr. J. S. Haldane, of Great Britain, that as some dust had a favorable physiological reaction and some an unfavorable one the mining world should fight bad dusts with good ones, especially where the use of water was undesirable by reason of high temperatures.

To the coal-mining fraternity, with its relatively shallow mines, the need for fighting dust with dust is not of great practical interest, but the idea that there is such a thing as a benign dust that helps the lungs was believed by some to have been laid low long ago by Dr. Meriwether's investigations, and yet now the question is again raised: Is all dust evil and is some actually helpful? Should the shale-dust requirements of the U. S. Bureau of Mines, tentative as they are, especially as to silica content, have permanent acceptance or be modified?

W. J. McConnell, Industrial Health Service, Metropolitan Life Insurance Co., presented a paper entitled "How Human Beings Respond to Changing Atmospheric Conditions." He said that the upper limit of man's ability to compensate for atmospheric conditions, when at rest and in motionless and saturated air is reached at about 90 deg. F. If the air moves with a velocity of 200 ft. per minute, the upper limit is shifted to about 95 deg. If the air velocity is increased to 400 ft. per minute, a further shift occurs. When 90,000 ft.lb. per hour of muscular work was performed, the limit was reached at about 80 deg. F. effective temperature.

At these limits the circulatory system begins to be disturbed. More blood flows through the capillaries, and with this change comes an increase in the pulse rate. The skin becomes flush and sweats profusely. When the pulse beats reach 135 per minute the subjects experience discomfort. They become restless and irritable, have headache, palpitation of the heart, great thirst, and a metallic taste. They speak only with effort.

At 160 beats per minute, dizziness, confusion, often nausea, numbness or soreness of the face follow. A feeling of "floating in the air" supervenes, and a heatstroke becomes imminent. Apparently the increase in the respiration is not due to lack of oxygen, for the breath can be held readily, but is solely a device of nature to assist in cooling the body.

At 100 deg. F. four times as much work can be done where the humidity is only 30 per cent as can be performed where the atmosphere is fully saturated. With an ordinary humidity of 60 per cent five times as much work can be done at a temperature of 90 deg. as at a temperature of 120 deg. When the air is above body temperature its movement serves only to increase discomfort.

D. Harrington, chief engineer, safety division, U. S. Bureau of Mines, said that five men at Butte climbed up and down 120 ft. of ladders each taking 5 min. and resting 20 min. between climbs. At 70 deg. with 95 per cent humidity, the effort was play; at 75 deg., it was work; at 80 deg., it was hard work and at 85 deg. the pulse rate went up to 135 and even 140 and the body temperature rose to 102. At 90 deg. a trip up the ladders and back raised the body temperature to 103.8 deg. But men of all types and races do not respond in equal degree to temperature changes. Dr. McConnell said that high temperatures tax a man with a low pulse rate less than a man with a high pulse.

George S. Rice, chief mining engineer, U. S. Bureau of Mines, declared that in Germany, wherever the temperature was 80 deg. and the air was saturated, the law required that the length of the shift be reduced from eight to six hours. Mr. Harrington said that at Butte, where the mine temperatures ranged from 92 to 93 deg., the men received an increased wage and worked seven hours. That differential is now removed, better ventilation having lowered the temperature.

THE men, he added, used ice water extensively, and without ill effect. George E. Thackray said ice water was forbidden around blast furnaces, as it caused cramps, but Dr. McConnell stated he had not found ice water objectionable in the laboratory tests, and that it was forbidden at furnaces because of the rapidly variant temperature to which the men were exposed. It was said that in the hot workings of the Comstock lode the men not only drank cold water but had it thrown over them, without bad results.

Henry F. Hebley, Allen & Garcia, described ventilation problems at the New Orient mine of the Chicago, Wilmington & Franklin Coal Co., Orient, Ill., where the future resist-

ances of the mines when extended the full distance of 6 miles from the present shaft were carefully determined and plans made accordingly. Mr. Hebley explained that the foot of one of the shafts would be shaped so as to give a vertically curved airway in two directions toward the approaching entries.

Asked if these curves would be arranged on the floor as well as in the roof, Mr. Hebley answered that at the Wildwood mine, in Pennsylvania, vanes were being used to assist in making such turns and that it was the intention to install some such arrangement at Orient. Cadwallader Evans, Jr., general manager, Hudson Coal Co., Scranton, Pa., said that his company was turning a rectangular shaft into a circular one, using Schaefer lining. It was hoped that indications would be obtained from this installation as to the manner in which important power savings could be effected.

Mr. Harrington presented a digest of recent opinions on the effect of abnormal air conditions on mine workers, prepared by R. R. Sayers, chief surgeon, U. S. Bureau of Mines. Dr. Sayers quoted Dr. Haldane as saying in South Africa that the use of a "healthy" dust might prevent silicosis. This disease is absent in British coal mines although they are rock-dusted to prevent coal-dust explosions and although the dust for this purpose contains about 35 per cent of quartz and 60 per cent of total silica. According to Dr. Haldane, the menace of working with a refractory material which is about 98 per cent silica had been overcome by the admixture of only 10 per cent of a "healthy" dust.

IN discussing this, Mr. Rice said that Dr. Haldane had noted that of two mines in Cornwall one had many silicotics and another none. The second was believed to be free of silicosis because of the presence of protective dust. However, said Mr. Harrington, Dr. Haldane went to Cripple Creek and reported that at the mines of that place there was no silicosis, which in a sense was true. The silicotics of Cripple Creek were in the Denver hospitals. One cannot be too careful in analyzing the situation, for as soon as a man becomes affected he tends to leave the mines, and this raises the silicotic record of non-miners. In this way his case is held to disprove that miners are silicotics, when really it is evidence that miners actually suffer from the disease.

In this regard Dr. Lanza remarked that the effect of "healthy" dust, if such there be, probably was chemico-biological. It changes the acid-alkali balance in the tubercles, thus furnishing a medium less favorable for the development of the tubercle bacillus.

Some time back, said Mr. Harrington, a number of British coal miners were aided in migrating to Canada, where they were expected to find places on farms. They found themselves out of work and drifted to the Ontario metal mines, where the operators, desiring to keep out silicotics, subjected them to careful inspection and found none of them free of the incipience of that disease, which shows that it is not safe to assume that, because of the beneficent effect of clay, shale, and coal dust, the coal miner is wholly free from silicosis. James H. Allport, Barnesboro, Pa., remarked that in the Andes the labor turnover was 300 per cent per month. With such mobility in labor it was impossible to form any conclusions.

IN THE afternoon Mr. Harrington presented a paper on "Data on Metal-Mine Ventilation in 1929." In this discussion Mr. Harrington said that a man overcome by a pure nitrogen atmosphere could not be resuscitated. He also quoted from a coroner's verdict in England with regard to a miner who, having been born within the Forest of Dean, was allowed a small concession in which he ran a mine. His widow stated that he had worked in coal mines for 50 years. The doctor who made a post-mortem said both lungs were jet black and very hard. The verdict of the coroner was "death from pulmonary consumption"; in short he had taken into his lungs so much healing, healthy coal dust that—he died. However, the coal was kind to him, for he was 68 years of age when he succumbed to dust—if that was what finally caused his death.

Mr. Harrington quoted L. Holland as saying that while fighting fires some men suffered from intense irritation of the skin, whether from the loss of water or of salt. Dr. Hancock was also quoted as saying that where sweating was common, skin irritations ensued. Boils occasionally appeared under these conditions, as also where the air was not as good as it should be. Boils, said Mr. Harrington, have caused much trouble in some of the mines of Nevada, and usually the trouble has occurred in mines that are hot and wet.

B. F. Tillson, general superintendent, New Jersey Zinc Co., Franklin, N. J., stated that at his mines the men had had trouble with boils. He thought it was due to sewage. Care was being taken now to keep the mines free of such contaminating influences. The body wastes were removed and the old filled stopes were treated with calcium chloride. As a result there had been no recurrence of the affection.

R. Dawson Hall said that little was known about the occurrence of septicaemia in American coal mines. Could it be possible that the coal mines of the United States are less septic than those in Great Britain, by reason of greater acidity, less age and —it may here be added—less animals? Dr. McConnell said that boils are merely oil pimples or blackheads. It is only when the pimples are scratched, and thus infected, that they become boils. Mr. Harrington declared that the men working in Comstock mines after two weeks developed boils from knee to thigh and had to stay out of the workings from three weeks to a month.

Mr. Harrington then briefed his paper on the gases which occur in metal mines, in which paper E. H. Denny was a collaborator. He showed that metal mines have an even greater number of gases and sometimes a greater quantity of noxious gas than coal mines. The authors closed the paper with the reflection that: "The generally accepted conclusion that coal miners have a healthful occupation and live to a ripe old age, and that many metal miners contract diseases such as lead poisoning and miners' consumption, and either die early in life or are incapacitated in middle age, is due almost wholly to the superior working conditions in the coal mine, brought about chiefly by ventilation."

PROTECTIVE measures against gas hazards at the United Verde mine were reviewed by O. A. Glaeser, safety and ventilation engineer, United Verde Copper Co., Jerome, Ariz. Unusual care is, and must be, given to safety at this mine. The sulphide ore is highly explosive, though it will not propagate an explosion. It has to be shot heavily, and in doing this it may be ignited. From the sulphide, gases more poisonous than carbon monoxide are evolved.

All ventilation is ascensional. The upper levels, being in ore that will not explode or give off dangerous gas, are fired first, namely at 3:15 p.m. The shots in the 2,250-ft. level are then

fired from 3:20 to 3:30 p.m., and after touching off the spits the men file out past the shift boss, who counts them. The latter then telephones the shift boss on the 2,400-ft. level that all the men are out; this boss signals back to the first and then directs his men to light their spits. After this they file out and are counted, and then the shift boss on the 2,400-ft. level signals to the shift boss on the 2,550-ft. level, and so on till the lowest level is reached. Two permanent rescue stations with compressed-air lines from two directions are provided on each level for use in case of overpowering gas or fire. Fire watchmen patrol the workings.

A.I.M.E. COAL DIVISION Holds First Meeting

WITH some of its most vital interests pre-empted by the Ventilation and by the Ground Movement and Subsidence committees, as also by the classification meeting, the Coal and Coal Products Division of the American Institute of Mining and Metallurgical Engineers found few technical matters to discuss last month. This division met, as a division, for the first time Feb. 18 and proceeded to adopt, with minor changes, the bylaws prepared by the preliminary meeting of the Coal and Coal Products Committee in Pittsburgh, Pa. H. N. Eavenson, Pittsburgh, occupied the chair and announced that the division represented some 850 members and included all who were interested in coal, either from a producing, treating, or consuming angle.

The following were announced as the officers, as already elected by letter ballot: H. N. Eavenson, chairman; W. H. Fulweiler, vice-chairman; F. G. Tryon, H. D. Kynor, E. J. Newbaker, executive committeemen for three years. T. G. Fear, T. H. Claggett and J. A. Garcia serve in that capacity for two years; and M. H. Fies, T. A. Spencer, and G. W. Evans, for one year.

Discussing the need for the interest and co-operation of the younger members, Cadwallader Evans, general manager, Hudson Coal Co., described the extension schools conducted by the Pennsylvania State College in the anthracite region. These are located at Wilkes-Barre, Scranton, and Carbondale. The

H. N. Eavenson

course costs $20. The men meet every day of the week except Saturday and are taught what they need most to know; if English, then English; if arithmetic, that is what is taught; but mining law, ventilation and other basal studies are taught in any event.

Three hundred students must agree to attend the school before operations begin. The men attending the classes are miners, mine laborers, firebosses, sectional foremen, and a few mine foremen. Each room has a part-time instructor. One full-time instructor travels around from room to room assisting and supervising the classes. About 85 per cent of the number enrolling is present every evening, which indicates the interest shown.

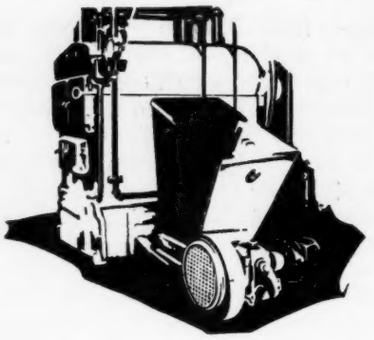
Fred W. Jordan, Youngstown, Ohio, read a paper on the evaluation of coal for coke-making. He said that a 1 per cent reduction of ash had been rated as increasing the value of the coal from 10 to 30c. Much depends on the freight rate, for the greater the cost of the coal the greater the economy in having it clean before shipment, and the greater the money saving in coking.

He called attention to the fact that the ash which was segregated made the coke weak and caused degradation. The ash that was finely divided was not so objectionable. He estimated, roughly, that 3c. should be added to the value of a net ton of coal for each per cent of ash below the ash in the standard and 4c. should be added for each per cent of high-gravity coal (1.55 and over) below that in the standard.

Thus, if the standard coal sells at $3.12, a coal having 2.3 per cent less ash should be worth 3x2.3, or 6.9c. more, and if the same coal has 4 per cent less high-gravity material, it should have a further credit of 16c. Thus the total credit should be 22.9c. and the price $3.349.

R. H. Sweetser, assistant to the first vice-president, American Rolling Mill Co., Columbus, Ohio, regretted that the evaluation was negative in character. It seemed to pay for what the coal did not contain rather than for the carbon it did contain. Sulphur, also, was not considered. There seemed to be a reference to washing in the evaluation. He favored a value that depended on coal quality, however it might be obtained. Mr. Jordan explained that he was not talking about reductions in ash, but, like Mr. Sweetser, was discussing value that depended on coal quality, ties regardless of every other consideration.

W. H. Blauvelt, consulting engineer, New York City, was afraid that Mr. Jordan had considered too few variables. There were variations in quantity and value of coke from different coals, variations in blast furnaces and in size and character of ores, which made different furnaces profit more largely or less largely than others on the improvement or inherent superiority of the coal; there were changes with the price of tar and with the quantity of it obtainable. These were only a few of the many variables to consider. Perhaps we should never get a formula that will satisfactorily correlate the virtues of any given coal for coking, and evaluate its true worth.



AUTOMATIC STOKERS

+ Invade Natural Gas Area

And Gain in Coal Mining Fields

IT IS significant that automatic stokers of the type designed for small heating boilers have gained a foothold in southern West Virginia, where coal and natural gas are so plentiful. Installations displacing hand firing have been made right at the mines, where fuel economy means the least, and others have been made that displaced natural gas.

Early this winter the Island Creek Coal Co. installed three stokers at Holden; one of these in the general superintendent's residence, one in the company hospital, and the third in the "Bungalow," which is a club house for out-of-town officials. Performances of the units have been well up to expectations.

Several reasons figured in the decision to go to the use of automatic firing on these boilers: (1) The officials wanted first-hand information on this method of using the company's product. (2) It was desirable, especially at the hospital, to get away from the disturbance and noise of the watchman shaking the furnace grates and adding coal at two-hour intervals during the night. (3) It was desirable to maintain more uniform room temperatures than was practicable with hand firing. (4) Reduction of smoke and soot from the chimney was another attractive feature. (5) A small saving would result from more efficient combustion and from the use of screenings instead of lump coal. (6) Low-water protective devices of the stokers probably would save breakage of boiler sections such as sometimes occur with hand firing. (7) Automatic firing would greatly reduce the labor of furnace attendance.

The "Bungalow" installation is on a water tube steam boiler which supplies heat to 1,013 sq.ft. of radiation. The hospital installation is on a seven-section steam boiler capable of taking care of about 1,500 sq.ft. of useful radiation. The fuel burned in the three Holden installations consists of 1¼-in. screenings from the Island Creek seam.

These stokers are of the screw underfeed type and are equipped with time interval contactors to aid in holding fire during warm periods when the room thermostats do not call for heat. Every three hours the stoker feed-screw and forced draft fan start automatically and run for 3½ minutes. In the feed hopper is a mechanical agitator to prevent arching of wet coal.

Increases of 40 to 50 per cent in natural gas rates during 1929 proved a spur to the installation of automatic coal stokers. Buildings and residences that had always been heated by gas shifted to the use of coal. At the old rates of 20 to 25c. per thousand cubic feet, customers seemed content to continue with gas, but with this fuel raised to around 35c., the use of coal screenings presents an attractive saving.

H. S. Gay, Jr., general superintendent of the Gay Coal & Coke Co., recently completed a home at the Gay mine near Logan, W. Va., which is heated by an automatic stoker of the same type as those installed at Holden. In this case the new residence replaced an old building which was heated by natural gas. It is an eleven-room house containing 700 sq.ft. of radiation. The furnace is in a corrugated iron shed located 150 ft. from the house. Because of the forced draft supplied by the stoker, a relatively small steel stack suffices as a chimney.

The coal bin is arranged so that the

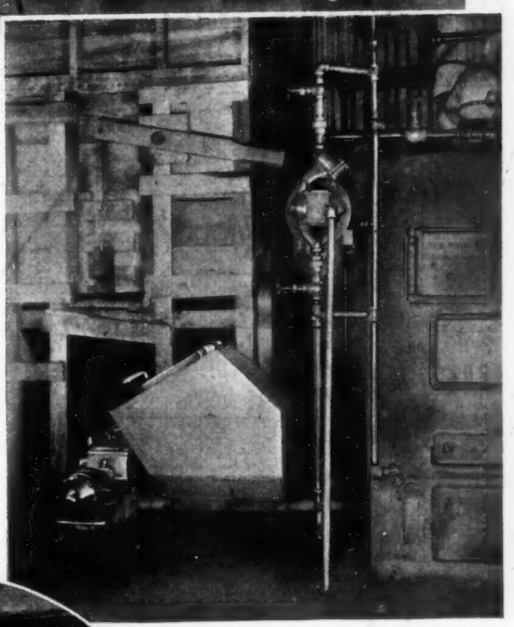
Residence of General Superintendent, Gay Coal & Coke Co.

stoker hopper is filled by inserting the end of a steel trough in the hopper opening and allowing the coal to run in from the sliding gate of the bin.

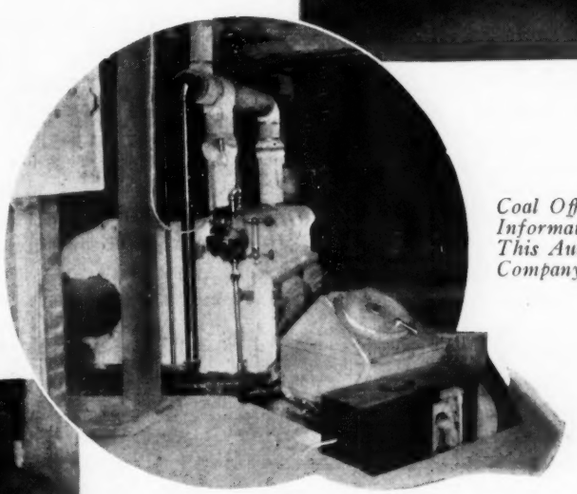
In Huutington the Robson-Prichard office and bank building is now being heated with coal instead of natural gas, and at a fuel cost reported to be less than half the former figure. One of the accompanying photographs shows the automatic underfeed stoker as recently installed on an 80-hp. boiler in this building. Screenings from the Island Creek seam is the present fuel. The First Huntington National Bank Building also has changed over from gas to coal and directors of the Coal Exchange Building have authorized a like change. This means that slack coal, automatically fired, is replacing natural gas in three of the largest office buildings in the city of Huntington.

At Williamson, the Fairview greenhouses likewise have reduced the heating cost by burning screenings in an automatic underfeed stoker and discontinuing the use of natural gas. These are but a few specific examples of a definite trend in a territory where coal is cheap and must compete with natural gas selling at 30 to 40c. per thousand feet. Use of the small automatic stoker under such conditions points to a brighter future for coal over the country at large in its competition with gas and oil for domestic heating.

Night Firing of the Furnace No Longer Disturbs Patients in the Island Creek Hospital

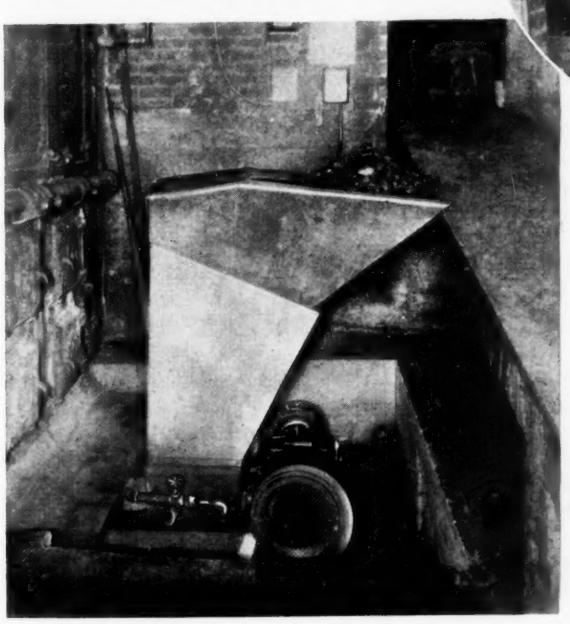


At the Gay Residence Even Loading of the Hopper Has Been Mechanized; Note the Lower Gate



Coal Officials Get First-Hand Information on Performance of This Automatic Stoker at Company "Bungalow"

Firing the 80-Hp. Heating Boiler in the Robson-Prichard Building



PROMOTION of mechanized heating in household, office, institutions, and small industrial plants, like charity, ought to begin at home—the home of the coal man. The best salesman for automatic coal-burning is the individual who is using the system he praises. For this reason, the recent development in southern West Virginia has more than a passing significance.

SUBSIDENCE

+ An Intensive Study of the Behavior of Pillars

WHEN a pillar in a coal mine has to withstand a heavy head of water, how does it accomplish it? George H. Ashley, state geologist of Pennsylvania, discussing "Barrier Pillar Legislation in Pennsylvania," at the meeting of the Ground Movement and Subsidence Committee of the American Institute of Mining and Metallurgical Engineers, in New York City, Feb. 20, answered the question by saying that the barrier pillar appeared to him and to his associates on the Pennsylvania barrier pillar commission rather as a beam between two supports spanning the distance between the upper and lower rock than as a dam relying for its strength on its inertia.

The strain to be feared was not that imposed by the water but that resulting from rock pressure on the pillar. Once the strength against crushing was provided the water would be unable to remove the pillar. Whether the water would be successfully impounded was doubtful, no matter how big the pillar might be, for water may pass through the coal, the roof, or the floor, leaving the pillar intact. However, if the water does escape, or partly escape, it will do so slowly and safely, even though its passage may have an unfortunate economic effect on the operation of the mine workings at a lower level.

A British report quoted by Dr. Ashley stated that of 84 drowning disasters in British mines, all but 18 were due to mining through flooded workings where mine maps were faulty or lacking. In the other 18 the workings were driven into water-bearing, faulty, and dislocated strata. Of 308 major accidents listed by the U. S. Bureau of Mines in Bulletin 115, seven involved drowning, 3 being inrushes of surface waters or sand, 1 an inrush of water from an old shaft and 3, all in Pennsylvania, being due to penetration by workings into forgotten or poorly mapped areas of extraction. In some cases a 10-ft. pillar has withstood large heads of water. No record was found of a pillar being broken through or pushed out by water with fatal results to men in lower workings.

A rule was finally devised by which it is provided that the minimum pillar shall not be less than 20 ft. plus four times the thickness of the coal bed, plus 10 ft. for each 100 ft. of depth or fraction thereof at the boundary in question. In advancing workings toward water, the boreholes must be kept 20 ft. in advance of the face instead of 12 ft., as heretofore, because a 9-ft. undercut frequently is made, and that, with a 12-ft. borehole, might leave less than 3 ft. of protection.

Howard N. Eavenson, Pittsburgh, Pa., argued that, as pillars could not be expected to hold water against extensive seepage, it was useless to require them to be more than 100 ft. thick. In fact, he said, one 50 ft. thick would be ample for all but a few extreme cases. He did not fear the tapping of water from an upper seam, as in most cases the upper seams are mined by drifts, which are almost self-draining.

G. S. Rice, chief mining engineer, U. S. Bureau of Mines, declared that the laws of Pennsylvania had been adopted quite frequently as models for legislation in other states. Was this statute suited for general adoption where depths might be greater? Dr. Ashley thought that in Greene County, the Lower Productive measures would be worked at extreme depths. The Pittsburgh bed was under heavy cover and the Freeports and Kittannings would be buried to an even greater depth.

R. Dawson Hall was of the opinion that, where the pressures were as great as those in Nova Scotia, the pillars might develop lines of crush like that which occurred at the Springhill mine, which, if it extended clear across the pillar, might pass a flood of water. The important matter was to maintain a pillar that would not crush in such measure as to let water through in immense volume.

Dr. Rice said that it had been found that where an air stopping fitted tightly into the coal at the ends it had ten times the strength of one that was not so fitted. It seemed to brace itself on the ribs. He believed the coal pillar filling the space between floor and roof with exactitude had from that fact a power to resist water pressure greater than its mere weight and bulk afforded.

A PAPER on "Subsidence in Thick Freeport Coal," by J. M. Rayburn, Pittsburgh, Pa., was presented by Mr. Eavenson. This paper detailed some levels taken over a 7-ft. seam of coal where 94 per cent of the coal had been extracted. As the first working left most of the coal in place, the second working being most methodically and completely done, closely approached longwall in character. The breaking line was shown to be in all cases over the partly worked area and not over the waste. Levels and plans were shown permitting of a complete time study.

Dr. Rice and Mr. Eavenson agreed that the advance in the break line over the area that had been up to that time merely first mined was due to the fact that the pillar face practically constituted a longwall and the first-mined area a solid pillar. Mr. Hall remarked that the point of draw, as Professor Briggs, of Great Britain, has indicated, should be determined not so much by rupture as by changes in level.

In the afternoon the subsidences at the Rio Tinto mines in Spain were described and discussed. Here are workings going back to Roman times or earlier with porphyry on one side of the pit and a shale, described by one of those present as carbonaceous, on the other. There have been tremendous slides or slumps, so many that it has been necessary to strip the sides, the porphyry on an average grade of 1.1 horizontal to 1 vertical and the slate at a much lower angle. The cuts in places are over 700 ft. deep. Some of the cracks in the slate show that the slump has extended back almost 1,600 ft. from the axis of excavation.

THE TAYLOR SYSTEM

+ And Modern Management

By HENRY P. KENDALL

President, The Taylor Society

HUMAN advancement in any field of affairs is dated by outstanding persons. Frederick W. Taylor symbolizes the successful beginnings of scientific management. The name Taylor has appeared frequently in connection with the word system. This association of ideas has been somewhat unfortunate, for Fred Taylor's life and work are more than a system. System is regarded as static. Taylor's influence upon industrial thought and practice has been dynamic. His work was more than a measurement of quantities. It was a revelation of new objectives and improved human relationships. His conception of human values was based on recognition of the undeveloped possibilities of individuals. He pointed the way to a more intelligent use of the powers of workmen, of tools, and of equipment. He was motivated by a desire not to shackle men but to liberate them.

When Taylor set out to measure a day's work he dug deeply into these basic and universal principles:

1. The development of a true science for each element of a man's work, replacing the old rule-of-thumb, b' guess and b' gosh method.
2. Scientific selection of the worker.
3. The training, education, and development of the workman.
4. Intimate, friendly co-operation between management and men.

There was nothing theoretical about those simple propositions which were formulated only after tens of thousands of painstaking studies. They represented the gathering together of new facts, and the classification, tabulation and reduction of the new knowledge to rules, formulas, and laws. Here was a new science, developed in the workroom first hand.

Taylor carried his case by the oldest and most effective method of teaching: demonstration. He showed that it worked, and, unless it *had* worked, its influence would have been negligible. The teachings which carry the power to make changes in human affairs are those which have been taken out on the highways and into the workshops. The fundamental task of management today is to prove the soundness of its methods, the rightness of its attitudes, and the honesty of its purposes by demonstration. We should have learned by now that ownership of industrial property is a doubtful honor unless there is good management.

Scientific management and the name of F. W. Taylor are indissolubly linked. What this management system, which is now finding increasing application in the coal industry, is, the fundamental principles upon which it was founded, and how it has grown are outlined by Mr. Kendall in this address. No less significant than the history here summarized is the discussion of the obligations which the Taylor philosophy imposes upon present management and the industrial engineering profession.

The effects of the Taylor science, philosophy, and art, have been so far-reaching that it is impossible to do more than merely touch on them. Today, any well-run manufacturing plant is trying to do things the one best way. Surveys which are made from time to time to determine the scope of scientific management indicate that over 50 per cent of the plants in the United States and Canada are using some or all of the technique and methods first expounded by Fred Taylor. In the matter of piece rates, time- and motion-study today are the rule rather than exception, and piece rates have been lifted out of the realm of horse trading into the realm of fact, where they belong. Planning of stores, routing, scheduling, wage incentive methods of paying employees will be found in plants of every type.

The rise of scientific management has taken place during a period marked by great increases in living standards; by the maintenance of wage levels higher than the world ever has known before; by a tremendous increase in total wealth and by a diffusion of that wealth among hundreds of thousands of people instead of among thousands. Scientific management undoubtedly has been a contributing cause of the growth.

Mass production has been perhaps the most dominant phrase in the industrial vocabulary during the past decade. Analysis of mass production shows that the really differentiating characteristics of mass production are planning and functionalizing, both of which aspects of management were in the body of principles of Taylor and his group.

The effects of scientific management upon production of wealth and upon its wider distribution by way of higher wages have been communicated, from the raw material in those basic Taylor principles, through certain connectional machinery.

Cost accounting is one of the most important of these pieces of machinery. Today, there are backward concerns which operate with no accurate day-to-day knowledge of costs, but competition is too keen to give room to the company which doesn't know its costs. The significant thing is that condemnation to-

Abstract of an address entitled "The Development of the Art and Science and Philosophy of Management Since Taylor," delivered before the National Management Congress, Chicago, March 3, 1930.

day is visited on the heads of the backward companies not only by the business public but by the general public, who, by the vote of their purchasing dollars, declare the inefficient company unworthy of support. Consumers, of course, do not buy goods of an efficient company in preference to an inefficient company, because goods are bought and sold on their own merits, but the inefficiencies in management inevitably become reflected in the quality and the value of products.

The growth of research is another specific effect which traces back to the early scientific management principles. Research has become one of the most powerful forces in modern business. Research builds new industries; it builds new values into old industries. Research is giving new materials; for example, alloy steels, cellulose products, such as celluloid film paint; rayon, and others. Research is discovering new uses. Research found 100 new uses for salt, a commodity as old as mankind. Research develops new tools, like pneumatic drills, the oxyacetylene torch, arc welding, conveyors. Research discovers new methods; new markets. It is the eyes of our business—and a far-sighted pair of eyes too.

A third major set of connections between the principles of Taylor and present best management practice is the organization of machinery for selection, training, and caring for work-people. Personnel departments today have real standing in well-managed concerns.

THE early applications of principles of scientific management were confined to production, whereas today they are found in the sales, marketing, and merchandising ends of the business, and in finance and general administration. Possibilities of the scientific or functional type of management in the distribution of goods are such that scientifically controlled distribution may be said to represent perhaps the greatest possibility before business executives today. Taylor aroused incredulity when he said that millions upon millions of dollars was being wasted in inefficient production of goods. The temper of our time is different. Today when we hear that $8,000,000,000 annually is wasted in distribution of goods, we believe it.

Today's widespreading readjustments and changes impose more exacting responsibilities upon management than in any other period of our country's economic development. Profit margins per unit of sale tend to narrow in our quick-moving age, when neither manufacturer nor merchant finds it possible to speculate on large stocks. Intensive mechanization of the industrial process helps to create temporary unemployment situations. Demands for expensive services, competition, surplus of brick and mortar in plants; these and many other factors add burdens which management must

HENRY P. KENDALL

The president of the Taylor Society first made application of the principles of scientific management more than thirty years ago at the Plimpton Press, where his work was started under the guidance of F. W. Taylor himself. Next he was asked to study the situation at a textile mill in Walpole, Mass., where, as a result of his investigation, the plant was reorganized on the principles which Taylor was proving to be the one best way of management. From this experiment grew the Kendall Co., controlling three allied companies in New England, five cotton textile mills in the Carolinas, and Bauer & Black in Chicago.

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shoulder. They cannot be shifted into the realm of politics or passed along to philanthropists.

Management today holds the key to the future of America, both economic and social, and to a large extent, moral. The responsibility of the employer toward his employees is well-defined. The spotlights of public opinion search out relentlessly the dark places in industry.

Management's job, in the years ahead, is a big one. The opportunities are great. The problems are in ratio to the opportunities. Collective action has become an instrument of progress, but collective action does not rise above the philosophy and the principles actuating individual managements. The individual management has at hand today more mechanical equipment, more power, more diverse resources than ever before, but the very extent and complexity of our present-day industrial mechanism means an increased responsibility for intelligent, enlightened control.

EMPHASIS on methods and machines often is too great. The machine and the method should not dwarf the man. Management operates in the field of human lives. The destiny of men and women is affected by management decision and policy, and management cannot pass the buck. The top men in a business determine, by their ideals, their philosophy, and the breadth and warmth of their purposes, the final effect upon employees and upon society of that particular business. Delegation of responsibilities is a necessity. But the responsibility for the soundness of human relations cannot be delegated; it rests on the shoulders of the top executives. They set the pace and the example. They determine whether the dog-eat-dog, cutthroat type of relationship prevails or one of sympathetic understanding, clear thinking, and honesty of motive.

Unemployment is one of the many specific problems to which management today must direct attention. Thus far we have not, in this country, adequate machinery for gathering and keeping up-to-date, accurate figures on unemployment. Management should bring its weight of influence to bear to get a provision for having such figures. Only when we have them can we deal scientifically with the unemployment question. Unemployment as a broad national question is beyond the control of a single manufacturer. It is a problem for collective action. The individual industrial establishment *can* contribute to stabilization. By better planning, a company can reduce its peaks and even up its valleys. Seasonal dips can be corrected, perhaps by new products or by developing new markets.

The Taylor philosophy definitely charged management with certain responsibilities, and today's conditions validate the soundness of that viewpoint. We must recognize that uncertainty of employment is a basic cause of social unrest, and that better management can make its contribution, through both individual action and collective action, to lessen the cause.

LETTERS
. . . to the Editor

Machines Can Cut Uphill As Fast as on Level

In *Coal Age* February, 1930, issue, appears an article "Belgium Cuts Her Steep Seams by Machinery." The article states:

"The dragging of an ordinary longwall machine up along the face may require so much of the power developed by the motor that too little is available for the cutting, thus making the operation of the cutter unprofitable."

This statement, and also the tables giving the length of face cut per hour on various degrees pitch, are erroneous. It takes only about 1 hp. to lift the machine bodily with the feed rope at a feed speed of about 2 ft. per minute, which is a good average speed; therefore, the power used in pulling the machine upgrade is negligible. Practically the full power of the motor is available for cutting, regardless of how steep the grade is.

There are many longwall machines working on steep pitches in the United States. In one case the pitch is 30 deg., and the machine advances 2 ft. per minute on this grade, exactly the same as if it were on a level. The power consumption is not any greater than on the level; it might even be somewhat less, because the cuttings slide out of the road and do not choke up the chain, as might be the case if not shoveled on the level.

The cutting per hour is, of course, less on a steep pitch than on the level, but that is not on account of any loss of power in pulling the machine, nor any loss in the rate of feed per machine, but due to the time it takes for the men to get around, setting jacks, timbering, and in general moving themselves about on the face.

In order to reduce this lost time, in some mines they string a steel rope along the face, anchored at the upper end. To this is hooked the feed rope on the machine. With this arrangement there is much less labor, as there are no jacks to be carried and set up, and the men can take hold of the rope and pull themselves along, and they can move around more rapidly.

As to cuting downhill, this is impracticable; first, they could not get the cuttings away from the machine; it would choke up and put a heavy overload on the motor, probably stopping the cutter chain. Second, no machine runner would feel like sitting down below the machine, and if a man from the upper side of the machine should slide downhill (which very often happens), he would land on the cutter chain.

The coal operators would be glad to cut downhill as well as uphill, as it would save time in bringing the machine down for the next cut, but as this is impracticable, the longwall machines designated for steep pitches are provided with an extra drum and steel rope. The drum is provided with a powerful brake, which in doing the cutting will keep the machine from running away in case the feed rope should break a jack or pull loose. The same drum is used also for letting the machine down after the face is cut.

N. D. LEVIN,
Chief Engineer, Jeffrey Mfg. Co.
Columbus, Ohio.

Bar Machines Better Than Chain Cutters

I have read with interest and surprise the article in your issue of February, "Belgium Cuts Her Steep Seams by Machinery," by F. C. Cornet and am astonished at the space devoted to adverse criticism of the bar or horn machine. In order to correct any false impression as to the virtues or otherwise of this machine, I wish to make a few remarks on statements made.

It is stated that this machine grinds the coal and, because of the dust it makes, creates conditions unbearable to the men. The machine referred to as being formerly used in West Virginia, a description of which was given in *Coal Age*, Vol. 2, pp. 914, was an attempt by the mining company to build a shortwall machine incorporating the use of a bar cutting member, no shortwall machines of this type being on the market. It was called the "Hess" dustless machine. Please note the word "dustless."

Correspondence with this company indicated highly satisfactory results, but it is probable that difficulty was experienced in design of working parts, and under the circumstances its use may have been abandoned. This company is still interested enough in this type of machine, however, to express the desire to send a representative two thousand miles to inspect the work of a shortwall bar when one is placed on the market and operating on this continent.

Tests made under precisely similar circumstances of cuttings produced by bar and chain machines gave the following results:

		Per Cent— Bar	Chain
Above	⅞ in.	35	42½
	¾ in.	40	30½
	⅝ in.	12½	12
Below	⅝ in.	12½	15

These figures speak for themselves in terms of dust produced.

In the operation of a chain machine it is stated that the cuttings are automatically thrown out of the mining, whereas with the bar machine 90 per cent is left in. This would seem to prove that a chain machine must create more dust when working. The bar machine clears its cut through a spiral work conveying action, in addition to which an inclined metal plow, attached immediately behind the cutting member, scrapes out the cuttings which issue quietly along the front of the cut.

Regarding the lack of strength causing rapid deterioration with the bar machine, this is all "bunk." The writer is acquainted with at least one longwall bar machine, which after 13 years' work still retained all its original drive gears. The terrific noise supposed to accompany the working of these machines is a charge so utterly ridiculous that nothing can be said about it save that no machine has ever yet been built that operates more quietly, and it is, moreover, quite reasonable to suppose no other type ever will make less noise.

In working, it is stated, the bar machine depends upon side pressure to compel it to hug the face. It is usual in operating this machine to let the bar lag at a slight angle, so that the side props will take a little pressure in order that the cut will be even at the back and no jamming on an irregularly cleaned-up face result; but should it be necessary to take off this pressure, it can be easily accomplished by angling the bar forward slightly.

The statement is made that British bar machines are supplied to Belgium and it is indicated that the reason for their purchase lay in the matter of cost. The fact is that a chain machine costs only slightly more than a bar—about $70 to be more exact.

From these remarks it will be seen that there are good and substantial reasons why 160 bars are used to 17 chains and that their use is not dictated by price or lack of intelligence. Chain machines will do work that bar machines will not do, and bar machines will do work no other machine can do; it all depends on what you wish to accomplish.

L. C. STEVENS,
Edmonton, Alta. Mining Engineer.

COAL AGE

SYDNEY A. HALE, *Editor*

NEW YORK, MARCH, 1930

A study in contrasts

LAST MONTH the Labor Government in Great Britain won its second victory in the explosive coal legislation the MacDonald party has been pushing. The division in Parliament sustaining the Labor Government came in the rejection of an amendment to the bill offered by the Liberals. That amendment would have eliminated a provision for the compulsory regulation and limitation of output by the coal producers.

Great Britain, faced with shrinking coal markets and overdeveloped mine capacity, would make limitation of production legal and mandatory. In the United States, any such scheme would run foul of the sweeping prohibition of the first section of the Sherman act. And that act, as Washington again has sharply made known, is to be strictly enforced. England, as Gilbert once said, "with all its faults" still loves its House of Peers. The United States seems to cherish an equally strong affection for its anti-trust statutes.

"Niepozwalam!"

HOW MANY of the accidents that beset the mine worker are due to bad light and poor eyesight? Our casualty classifications, which are based on more direct causes than these, seem to assure us that no one is injured by the lack of light or of the ability to use what light is provided. Thus assured, everyone is ready to declare that darkness harms no one. And yet, the *National Safety News,* speaking on "Foot Candles and Casualties," declares that "15 to 20 per cent of all industrial accidents are due to inadequate light." In the coal mines it must be much more, for the light is distressingly inadequate.

It would be well worth while if some one would inquire as to every accident, whether imperfect light caused it or whether more perfect light would have prevented it. Probably in nine cases out of ten, dimness of vision, natural or due to imperfect sight, aided in the accident, though the record says nothing regarding that fact. Perhaps each of these accidents had several causes. For sake of argument, let seven be the number chosen. Bad vision, then, was only one of the seven, but six-sevenths of an accident is not an accident at all; perhaps not even what we term a near-accident. The differentiating factor is darkness. Without light, it happens; with light, it is avoided. So darkness has the casting vote, a vote that spells death or dismemberment.

In Poland from 1454 to 1791 for any action to become law, the nobles or their delegates had all to agree. The declaration of a single member could annul the united resolutions of the whole assembly. A Sicinski could stop the proceedings with the simple word *niepozwalam* (I forbid). Light often is like Sicinski. Like him it interposes its veto, and then death or injury are averted. Light does not have the power to consign to death, but it may reprieve those who would otherwise be thus consigned.

"There ought to be a law"

HOW PAINFULLY our mining statutes read! Taking them on their face value one would suppose that inspectors were taking cases to court frequently and obtaining salty fines against operators and mine workers alike. But in America such things are almost never done. In Britain it is different, but apparently even there the disgrace of a court conviction probably is the real deterrent, with the mine operator at least, and not the fine.

Fines and costs assessed in Great Britain in 1928, against 258 violations by owners, agents, managers, and undermanagers out of 295 prosecutions, aggregated $2,048. It is noteworthy that 189 of the convictions were for cruelty to or lack of care of animals, a matter on which the British are unusually keen. They have eight "inspectors of horses in mines" constantly examining cases of injury and cruelty; the United States has none. In all, Great Britain had in 1928, 48,625 horses and ponies in its mines, and the United States in 1924 had 36,352 animals. Obviously, the British lay more stress on the safety of animals than we do. This is partly because the low, narrow, and tortuous working places in British mines expose animal life to extra hazards.

Seven hundred under-officials and workmen were prosecuted, a much smaller percentage of the persons responsible than in the case of higher officials. Of these, 617 were convicted and on them were levied fines totalling $3,394, or about $5.50 per conviction. Leading among the offenses prosecuted were possessing matches and smoking; carrying timber, parts of machines, tools, etc., while ascending shaft in cage; breaking rules as to explosives; behaving in a violent or disorderly manner, and contravening laws relating to care, treatment, and cruelty to animals. One man was imprisoned for one month for failing to use a drag, another for 28 days for sleeping in the mine, and one for 14 days for behaving in a violent manner. Under the Protection of Animals Act, one man went to prison for one month, another for six weeks, and a third for two months.

Do these punishments suggest that the safety in British mines is due to law enforcement or does

the law enforcement show that the British take safety seriously? Probably both are true in part, and both aid the other. We have laws and penalties already, so the advocate of "there ought to be a law" can find his justification only as to special cases. What is needed is more stringent enforcement and a stronger sentiment. We shall not have enforcement without sentiment, and sentiment is likely to be strengthened if it be shown that breaches of the law result in a court conviction.

No place for tyros

SCIENTIFIC MANAGEMENT, as yet only grudgingly recognized by many operators, must find increasing application in the coal-mining industry. The newer problems of mechanization and personnel, the heavier investments in equipment and the changing market situation make more widespread adoption of scientific management inevitable. Results already achieved are battering down the empty alibi that conditions "are so different" in the mines that the principles first enunciated by Taylor have no place in the industry. As these results become better known, enthusiasm will replace indifference.

Unthinking enthusiasm, however, is as dangerous as blind indifference. The successful application of the principles of scientific management is not a task for untrained novices. Taylorism is not a rigid pattern which can be clamped down on any industrial application. Scientific management is not a collection of dead formulas, but a philosophy of living principles which, if they are to succeed, must be applied with understanding and with skill. Unless they are so applied, the results will be both unhappy and unprofitable.

Anybody of average intelligence, it is true, can hold a stop-watch on an operation. But scientific management means more than time studies. The time study is only the first step in getting at certain facts in an existing working condition. After that must come an understanding analysis of those facts and then, most important of all, the correct application of changes to establish more efficient production.

Children of darkness

EIGHT billion dollars, it is estimated, is the toll now annually exacted by waste in distribution. No attempt apparently has been made to break down this nonproductive tax on the commerce of the country by specific industries. If such a breakdown were made, however, it is certain that the proportion charged against coal would be substantial. Basically the cause of the waste is unwise competition and that competition is fostered by ignorance of broad current distribution facts.

Producers and sales agencies seeking to market coal along intelligent lines and through profitable channels find their studies of markets—which should be the first step in any new sales campaign—hampered by the non-existence of any reservoir of national data on the movement and consumption of coal. The most recent survey covers 1918! Fuel consumption data have been incorporated in certain figures of the Bureau of the Census, but these figures do not reveal the origin of the tonnage reported. Some excellent statistics are collected by railroads in a few districts, but, officially, these figures are not released to the public.

The only agency which seems to be persistently endeavoring to collate and publish the current fragmentary data on distribution is the Bureau of Mines. But this work cannot be continued or expanded without funds. Unfortunately it is not work of a character to capture the popular imagination. Support for appropriations for such work must come from the industry itself and from the large industrial consumers of coal. If this support is not vocalized, the Bureau and Congress may construe silence to be indicative of a lack of interest.

To what end?

IN TOO MANY COLLEGES, students look forward to executive rather than engineering positions as their appointed goal. They would sooner wrestle with budgets than with chemical formulas and with contracts than with geologic formations. They would sooner sign business papers than add to the sum of human knowledge. They would rather make a temporary than a permanent contribution to progress.

Executives, unless they are immensely wealthy and prodigally generous, rarely receive the world's approbation. Many of them are almost unknown to the man in the street, while, as Prof. Harry P. Hammond, Brooklyn Polytechnic Institute, remarked at the recent dedication of the John Markle Mining Engineering Hall, those who have become leaders in engineering and physics have never failed to receive public recognition. And President W. M. Lewis, of Lafayette, well said that though dollars were essential to everyone, no college should emphasize the dollar mark as the aim of scholarship.

Commenting on this discussion later, a personnel manager declared: "Too many college men are consumers only. They absorb the information given them, or at least some of it, but they make no effort to contribute or 'produce' anything. They look to the mental food they have received as if it should suffice to make them executives without their doing anything to produce new principles, laws or practices."

Part of this "consumer attitude" is due to faulty instruction and ill-presented ideals. Too many students look to education as a stepping-stone to affluence rather than as a ladder to accomplishment, because the higher purpose of education has been allowed to become obscure.

NOTES

. . . from Across the Sea

IN A DIGEST prepared for the Institute of Pacific Relations, which met in Honolulu during the past year, Boris P. Torgasheff, sometime lecturer of the Peking National University, revises all our estimates of coal resources tributary to the Pacific and so, quite incidentally, cuts the proportion of coal reserves of the United States to that of the whole world from 52 per cent to 42. Of this digest, entitled "Coal, Iron and Oil in the Far East," an advance proof has just been issued.

It declares that China has 2,183,430 million metric tons. The Twelfth International Congress of Geologists at Toronto gave China only 995,587 million tons—a sizable tonnage but not nearly as much as Torgasheff would credit it with. Japan and the Philippines are credited with less by this Russian author than by the congress; in fact the former country's resources are cut about in half and those of the latter about in three. But a big increase is that in Eastern Mongolia, which the geologists at Toronto apparently overlooked or underrated. In that area no less than 634,536 million metric tons is alleged to be awaiting the pick, shovel, and machine.

Digressing from Torgasheff's brochure, a correction may be made in the Toronto figures for the brown coal deposits in Victoria, which the Department of Mines of that province declared in 1913 to the International Congress totaled 31,114 million metric tons. This figure has since been raised to 37,189 million. Making this correction, the world tonnage is 9,051,044 million instead of 7,397,553 million, reducing this nation's proportion to 42 per cent. There is reason, however, to believe that the figures for this country are conservative. No credit is given to the New England coal, though some have been disposed to say that there is more coal in Rhode Island and Massachusetts than in the anthracite region.

It might be well to give the figures of Torgasheff side by side with those of the Twelfth International Congress of 1913, and that is done in a table. The variance between the figures shows how geologists differ and for a while must continue to differ as a result of the lack of finances to make good surveys; the lack of confidence that makes the institution of surveys difficult and the lack of development of the resources existing.

Actual and Probable Resources of Asiatic and Oceanic Countries With a Pacific Outlet

(in millions of metric tons)

	According to B.P. Torgasheff	According to Twelfth International Congress
China	2,183,430	995,587
Manchuria	1,275	1,208
Japan	3,760 (possibly 5,000; workable today, 1,738)	7,970
Russian Far East	2,865	173,879
East Mongolia	634,536	
Korea	320	81
Philippines	21	66
	2,826,207	1,178,791
Increase	.....	1,647,416
		2,826,207

Just recently the Safety in Mines Research Board of Great Britain has published its investigations into the "All Service" Gas Mask preliminary to use in British mines. This study was made by S. H. Katz, from the United States, assisted by C. S. W. Grice. The American mask performs its duty with a resistance of from 4 to 5 in. of water when passing 85 liters of air per minute. By enlarging the canister the resistance has been reduced to between 1.7 and 1.8 in., only 0.8 in. of which arises from the resistance of the canister itself. The rest is due to the passage through the mask and connections. The equipment thus modified will be known in Great Britain as the S.M.R.B. gas mask.

It is recognized that, as the quantities of absorbent materials used are nearly the same as in the canisters manufactured in the United States, it is necessary, if the air resistance is to be reduced, to arrange the materials in thinner layers, so great care has to be taken to assemble them correctly in the canister lest slight variations in the depths of the layers lead to premature breakdown. A description of these experiments and of the gas mask are contained in Paper No. 57 of the Board, entitled "Mine Rescue Apparatus: The S.M.R.B. Gas Mask." The only modification is in the dimensions. Otherwise the canister is an exact duplicate of the American mask.

A SERIES of experiments has been made by C. B. Platt and G. A. Cutler of the S.M.R.B., of Great Britain, on the danger that arises when the flexible cable connecting the headpiece of an electric safety cap lamp with its battery is short-circuited and begins to emit sparks. It is needless to explain that the cable usually consists of two conductors each composed of many strands of fine copper wire. Each conductor is separately insulated, usually with a layer of cotton, over which is placed a coating of vulcanized rubber, over which again is a further layer of cotton. The two conductors are then twisted together and inclosed in a rubber sheath. In some cases the strength of the two conductors is reinforced by a cotton core.

Should the rubber sheath, says the report of these investigators, become defective, the insulation of each conductor, being of a relatively delicate nature, is easily damaged, and if the insulation of both conductors becomes faulty, the battery may become short-circuited.

A large number of discarded cables were obtained from collieries, and 20 per cent of these were damaged to such an extent as to expose both the conductors. In many cases the rubber sheathing near the fault had been destroyed and no longer served as a protection. Some had been repaired for further service by covering the damaged sheathing with insulating tape. A cable so repaired, say the authors, can easily be rendered defective.

Experiments were made to determine whether the heat produced by contact between two wires connected directly to the battery could ignite explosive atmospheres of methane and air. Two copper electrodes of 16 S.W.G. wire were brought together and then slightly separated, so that a small heated spot was maintained between them by two heavy wires direct-connected to a 2-volt lamp battery. Ignition was obtained in 15 seconds where the methane content was 6.4 per cent and 8 per cent respectively, and in 30, 20 and 15 seconds with 8.5 per cent of methane.

Heavier currents, says the report, were maintained for a longer period with the free-acid cell, but the jelly-acid cell also is capable of maintaining a high rate of discharge, although the higher internal resistance which this electrolyte provides greatly reduces the time during which an excessively high rate of discharge can be maintained, but this depends on the consistency of the electrolyte. No reliance can be placed on this characteristic; consequently the time lag in ignition varies from 10 to 15 seconds.

Another danger is that the cotton insulation may ignite or smolder and burst into flame on coming in contact with the short-circuited or heated wires. A simple precaution would be to interpose a fuse between the battery and cable. This would melt before the methane became ignited. It should be simple, so that there would be no incentive in the lamp-room to short-circuit the fuse-holder to save time and trouble. The fuse should be reliable and quick to act. It could be made of the cartridge type to slip readily into place and be located in the battery case.

THE danger to be apprehended, conclude the authors, probably is very remote, but an adequately designed fuse could be simple and inexpensive and would eliminate any possibility of an accident from this cause.

Scraper loading has been unknown in England till quite recent years. The first application in Great Britain was made in 1929 at the Grange Colliery of Newton, Chambers & Co., and it was

followed shortly afterward by an installation at the Nunnery Colliery. Both these installations were described at a recent meeting before the Midland Institute of Mining Engineers.

The scraper is not in the form of a V but is of rectangular plan 3 ft. wide and about 6 ft. long, with a door at the end which is thrown out of the way when the scoop is traveling backward, and which is thrown so as to engage the coal when the scoop is traveling forward. The scoop is 20⅜ in. high.

Unfortunately, the face is not convex but concave, and the scoop accordingly, instead of being desirous of dragging itself into the face, tends to keep away from it and to drag down the props or chocks which deform the path from a straight line to the segment of a circle. To keep it in place rails are used, at first attached to the props and afterward to loose blocks of wood. The backs of the rails press against the timber and chocks under the movement of the scraper.

The rail at Grange is set 9 in. above the floor so as to prevent the scraper from mounting it. At Nunnery, heavy section rails 2¼ in. wide are used. These are laid on the floor. The coal is 27 in. thick, the top 9 in. being hard "branch" and extremely difficult to drill. Unfortunately, the floor is quite soft.

It has been found at Grange Colliery that the scoop method of operation reduces the percentage of ¼-in. coal, but at the Nunnery mine the proportion of fine coal is unchanged. It has not been found practicable to scrape the whole of the coal shot down. A varying proportion has to be turned over by hand into the scraper path. However, as the coal has to be pushed only into the path, the distance to which averages only 4 to 6 ft., a minimum of human effort is required—"certainly much less than is necessary with ordinary conveyors."

R Dawson Hall

On the ENGINEER'S BOOK SHELF

The Relative Inflammability of Coal Dusts: A Laboratory Study, Paper No. 56, by A. L. Godbert and R. V. Wheeler, Safety in Mines Research Board. British Library of Information, 5 E. 45th Street, New York City. 28 pp; 6¼x9¾ in. Price, 20c.

That coal which has lain a long time and become weathered is coal that has become inert to explosion is denied by the authors of this "paper." Its closing words are: "The occluded gases in coal dust do not materially affect their flammability, but "weathered dusts" containing oxygen loosely combined with the coal substance are rather more flammable than fresh dusts."

The tendency toward flammability, says the bulletin, is determined largely by the quantity of ulmins—those parts of the "coal conglomerate" which are more subject to rapid oxidation than the other parts. The readiness of a coal to explode is dependent on the degree of coalification of the ulmins.

Just as one begins to protest, What about the Utah coals? one notes that the authors say: "The presence of abnormal quantities of non-ulmin constituents (hydrocarbons, resins and plant entities, such as cuticles and spore exines) may confer an abnormal degree of flammability, for the reason that these non-ulmins are the principal oil-yielding constituents and yield their oils at a low temperature." So here the experimenter frees himself from the inhibitions of his own experiments. Some dusts explode because they have oxidizable ulmins and some explode because they have non-oxidizable non-ulmins.

Laboratory routine tests of the flammability of coal dust are described. The coal dust, or coal dust and inert dust, is blown with a current of oxygen into a heated quartz tube. If it burns, then it needs more inert dust to prevent the flammation, but if it does not, it has all that it needs. It is shown that the results of this laboratory test have checked well with experiments on a large scale in the gallery at Buxton.

* * *

The Forsyth Coal Field, Rosebud, Treasure, and Big Horn Counties, Montana; Bulletin 812-A, by C. E. Dobbin; pp. 55, 5¾x9 in. U. S. Geological Survey.

Contributions to Economic Geology, 1928; Part II, Mineral Fuels, by H. D. Miser, geologist in charge, U. S. Geological Survey; pp. 195, 5¾x9 in.

From the title of the first named book, its coverage can well be determined. The second is partly about oil fields, but it contains a description of the Pumpkin Buttes coal field in Wyoming by C. H. Wegemann, R. W. Howell, and C. E. Dobbin, and of the northward extension of the Sheridan coal field, Big Horn and Rosebud Counties, Montana, by A. A. Baker.

The Forsyth coal field includes the area covered by the mammoth strippings of the Northwestern Improvement Co., a subsidiary of the Northern Pacific Ry., in the Rosebud bed. The map accompanying the first book gives a good idea of the ravages of fire in the southern part of the Forsyth area. Many times as much coal has been reduced to clinker as there is coal remaining. The shallow beds have been changed from fuel to railroad ballast. There are a number of coal beds out West that lie under such shallow cover and if mined by underground mining their future is likely to be jeopardized. Fortunately, they can be and some are being stripped. When mined they are likely to fire spontaneously, and the fires once started cannot be extinguished.

All the coal seams in this area probably are in the Eocene age, and of either the Lance or the Fort Union formation. This fact explains why the coal is subbituminous. Some of the Rosebud seam is covered by 100 ft. or more of overburden, and in the first 100 ft. is found a hard, massive sandstone which must be blasted before being removed by shovels. Accordingly, it is probable that it will not be stripped to any greater depth than 100 ft.

The beds in the Pumpkin Creek coal area are not correlated with those elsewhere but are lettered from A to H. In general they are badly split and not of great thickness from a Western standpoint. Perhaps 12 ft. is the maximum thickness of clean coal.

In the extension of the Sheridan field the correlation is more complete, the Tongue River series being well in evidence—the Carney, Monarch, Dietz No. 3 and No. 2 beds, for instance. Perhaps the Rosebud has been discovered in one hole. It lies somewhat too deep to be uncovered without drilling in this area. Fire has been at work in this field also. Square miles are covered with excellent railroad ballast where coal at one time was to be found.

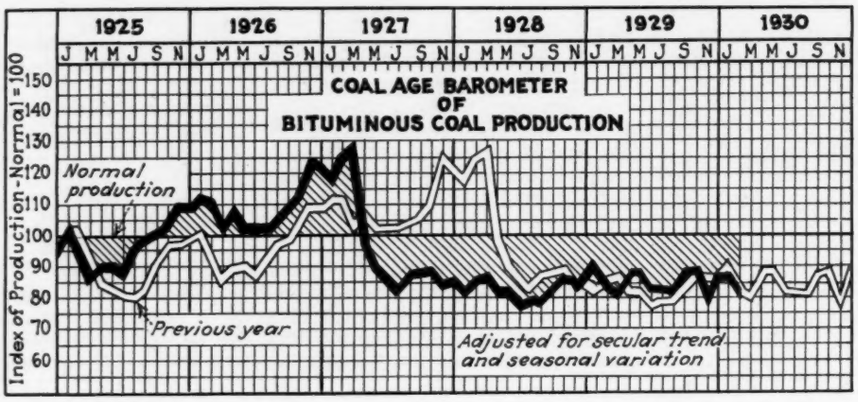
* * *

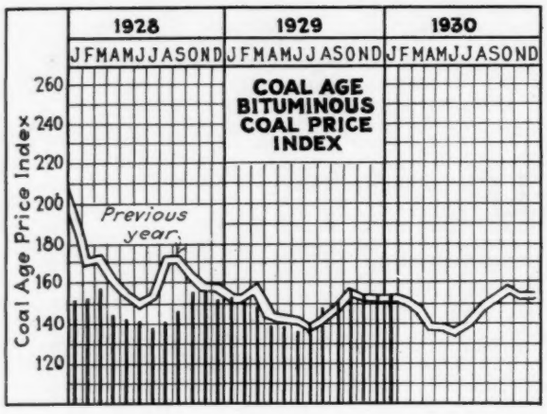
McGraw-Hill Coal Mine Directory, 1930; 564 pp.; 4¼x8½ in.; Published by McGraw-Hill Catalogue & Directory Co., New York City. Price, $25.

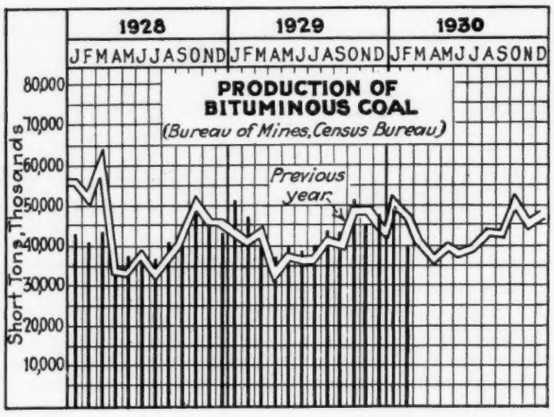
This book gives data regarding 2,880 of the more important coal-mining companies in the United States and Canada who collectively produce more than 94 per cent of the coal mined in those countries. The division of the main directory is by states and then by towns. Where the office is in another state or another town from the state and town in which the mine is located, both listings are given.

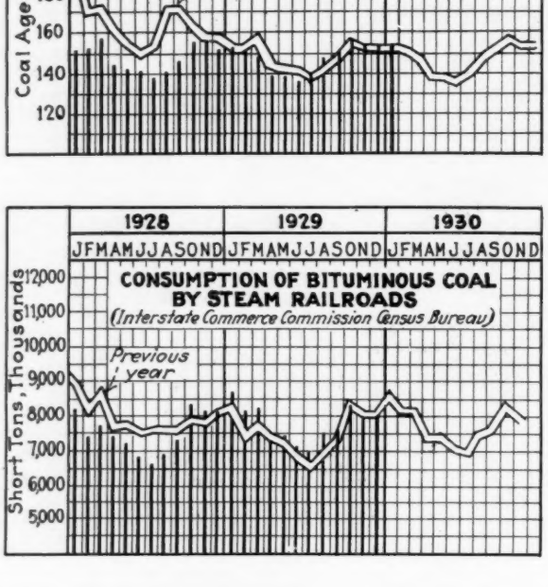
The list gives the name of the company, the location of its main office, its president with official address, its vice-president, also with address; its general manager, mining engineer, purchasing agent, its company store and store buyer, the name of the mine and under that head shipment point and railroad; the mine superintendent, the mine electrician, inside foreman, seam with thickness, kind of opening, number of employees, daily capacity, voltage, power purchased, track gage, and product. A list of mine inspectors, with addresses, and an alphabetical index of companies and mines listed complete the volume. This cross-indexing feature greatly increases its value.

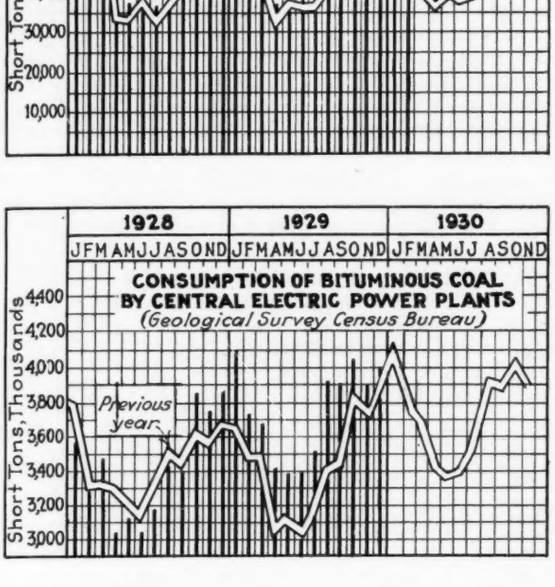
Indicators of Activities in the Coal Industry

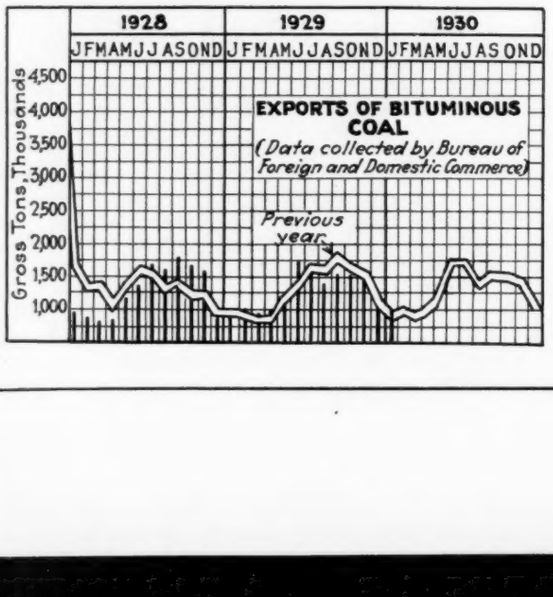


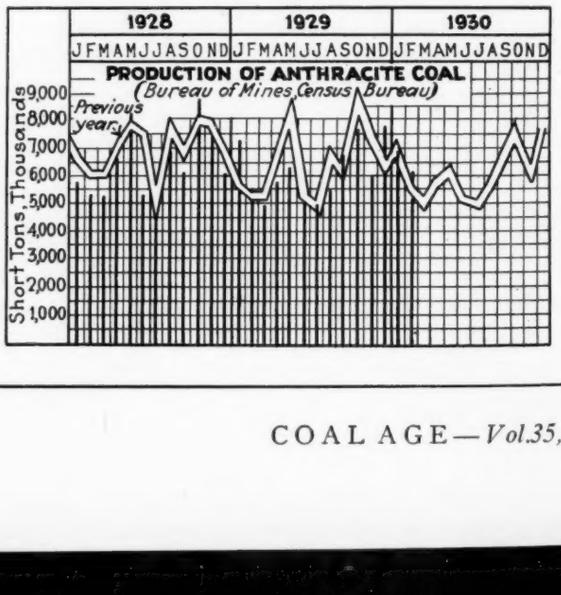












MARKETS in Review

WARM WEATHER over the greater part of the month of February resulted in abrupt slackening of business in the coal markets of the United States. Domestic demand was the hardest hit, with some markets reporting an almost complete stoppage. Carried back to the mines, this situation resulted in material curtailments in production in most of the fields. Prices slumped sharply along with the decrease in activity, falling considerably below the general level in February of last year. Screenings, however, recovered much of the ground lost in January as a result of reduction in production to fit the demand for the larger sizes.

Commercial stocks of industrial coal were 40,300,000 net tons on Jan. 1, a decrease of 1,500,000 net tons since Jan. 1, 1929, according to the U. S. Bureau of Mines. Despite this further decline in the quantity on hand, consumers still showed no disposition to add to reserves. Favorable transportation conditions and satisfaction with the spot market are contributing factors, fostering the hand-to-mouth attitude characterizing buying for the past year. Contracting, despite the approach of the season for signing up, attracted less attention than in other years, though some inquiries were received during the month.

February coal production is estimated by the U. S. Bureau of Mines at 39,615,000 net tons, a decrease of 10,163,000 tons from that of January and 8,285,000 tons from February a year ago. *Coal Age* Index of spot bituminous prices (preliminary) was: 146, Feb. 1; 149, Feb. 8; 146, Feb. 15; and 145, Feb. 22. The corresponding weighted average prices were as follows: $1.77, Feb. 1; $1.80, Feb. 8; $1.77, Feb. 15; and $1.76, Feb. 22. The revised Index figures for the month of January were 154, Jan. 4, 11, and 18; and 153, Jan. 25. The corresponding weighted average prices were $1.87, Jan. 4; $1.86, Jan. 11; $1.87, Jan. 18; and $1.85, Jan. 25. The monthly Index for January was 153¾, as compared to the unrevised figure of 146½ for February.

In response to the high temperatures prevailing over much of the month of February, conditions in the anthracite markets were dull. Inactivity characterized business in the domestic sizes, with consumers and dealers still manifesting a reluctance to lay in stocks. Chestnut was, as in January and the preceding months, the favored size, and was scarce over the whole of the month. Pea was the next size most in demand, being bolstered up by the brisk movement of chestnut. Announcements by a number of the leading operators that winter prices would be maintained until May 1, instead of ending on April 1, failed to stimulate demand.

THE mildest February in the history of the Weather Bureau played havoc with the Chicago market last month. Domestic sizes from all the fields were a drug on the market, and companies dealing in the better grades reported a decrease of 50 per cent in the demand, as compared with February, 1929. Unbilled coal was abundant and transit shipments from Eastern mines further depressed a burdened market. "No bills" in Illinois alone totaled over 5,000, and loads on hand at mines in Indiana, Kentucky, and West Virginia were so numerous as to greatly hamper production.

Domestic prices were weak and retailers enjoyed more bargains than many of them desired. As a result, retail stocks are topheavy, especially as the household demand was at a minimum. Smokeless prices on contract for March were reduced 25c. on prepared sizes, but as the spot market was on a level 25c.@75c. lower even than that, little stimulation in demand resulted. Lump and egg moved freely on mine-run contracts at $2.25. There was no change in the contract price for smokeless mine-run for March, though cuts of 25c. were made on some of the eastern high-volatile varieties.

STEAM sizes lagged during the month, despite the curtailed domestic demand, with ordinary grades of Illinois and Indiana screenings selling at $2.25 delivered at Chicago. Though this figure is 35c. above the low of the month, many considered it to be too low when the sluggishness in the larger sizes was considered. High-grade screenings were firm, more by reason of the insistence of the operators on better prices than any real improvement in demand. Western Kentucky varieties at the last of the month rose to 75c.@85c., as compared to 40c.@80c. in the middle of the month. Lump business in the non-union fields went off sharply in February, causing a drive for better prices on steam sizes during the contracting period.

Warm weather in February reduced the domestic demand in the St. Louis market to almost nothing, and enabled retailers to replenish stocks which were wiped out in the cold snap of January.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

		Week Ended							
		Feb. 1, 1930		Feb. 8, 1930		Feb. 15, 1930		Feb. 22, 1930	
	Market Quoted	Independent	Company	Independent	Company	Independent	Company	Independent	Company
Broken	New York	.....	$8.20@$8.50	.....	$8.20@$8.50	.....	$8.20@$8.50	.....	$8.20@$8.50
Broken	Philadelphia	$8.40@$8.50	8.40	$8.40@$8.50	8.40	$8.40@$8.50	8.40	$8.40@$8.50	8.40
Egg	New York	8.60@ 8.70	8.70	8.60@ 8.70	8.70	8.60@ 8.70	8.70	8.60@ 8.70	8.70
Egg	Philadelphia	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60
Egg	Chicago*	7.77	7.77	7.77	7.77	7.77	7.77	7.77	7.77
Stove	New York	9.10@ 9.20	9.20	9.10@ 9.20	9.20	9.10@ 9.20	9.20	9.10@ 9.20	9.20
Stove	Philadelphia	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10	9.10@ 9.35	9.10
Stove	Chicago*	8.22	8.22	8.22	8.22	8.22	8.22	8.22	8.22
Chestnut	New York	8.65@ 8.70	8.70	8.65@ 8.70	8.70	8.65@ 8.70	8.70	8.65@ 8.70	8.70
Chestnut	Philadelphia	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60	8.60@ 8.85	8.60
Chestnut	Chicago*	7.77	7.77	7.77	7.77	7.77	7.77	7.77	7.77
Pea	New York	4.75@ 5.00	5.00	4.75@ 5.00	5.00	4.75@ 5.00	5.00	4.75@ 5.00	5.00
Pea	Philadelphia	4.90@ 5.15	4.90	4.90@ 5.15	4.90	4.90@ 5.15	4.90	4.90@ 5.15	4.90
Pea	Chicago*	4.46	4.46	4.46	4.46	4.46	4.46	4.46	4.46
Buckwheat	New York	2.70@ 3.00	3.00†	2.70@ 3.00	3.00†	2.70@ 3.00	3.00†	2.70@ 3.00	3.00†
Buckwheat	Philadelphia	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75	2.75@ 3.00	2.75
Rice	New York	1.70@ 2.00	2.00	1.70@ 2.00	2.00	1.70@ 2.00	2.00	1.70@ 2.00	2.00
Rice	Philadelphia	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00	2.00@ 2.25	2.00
Barley	New York	1.40@ 1.50	1.50	1.40@ 1.50	1.50	1.40@ 1.50	1.50	1.40@ 1.50	1.50
Barley	Philadelphia	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50	1.50@ 1.60	1.50

*Net tons, f.o.b. mines. †Domestic buckwheat, $3.25 (D. L. & W.)

Screenings improved somewhat, in response to the lessened demand for larger sizes, and operators were enabled to move accumulations which had threatened to cause embarrassment at the mines. Domestic prices were unchanged from those prevailing in January, but screenings rose 10c.@15c. on the average during the month. Contracts to supply the entire fuel requirements for plants of the Owens-Illinois Glass Co., Alpha Portland Cement Co., Granite City Steel Co., Aluminum Ore Co., and Pittsburgh Plate Glass Co. in St. Louis have been signed by the Mississippi River Fuel Corporation. They call for 30,000,000 cu.ft. of natural gas a day.

DOCK operators at the Head of the Lakes, after a period of comparative inactivity due to warm weather, experienced a rush of orders when the temperature went down at the last of February. Light stocking, in part due to the excellent railroad service was still a cause of complaint, however. But with the domestic rush at the end of the month, assisted by increased takings on the part of the railroads, dock operators believe that total loadings will closely approach the figure of 31,390 cars reported for February of last year. At the same time, a large number of orders on the books give rise to the opinion that the loadings of 15,562 cars in March, 1929, will be exceeded this year. Light stocks and an increase in the area served by the docks are given as the reasons for the improved state of affairs.

An increase in the number of inquiries for steam coal was reported from industrial users, and shipments to companies for stocking purposes and to independent operators on the Cayuna range increased. Close competition characterized spot sales. Prices on both anthracite and bituminous coals showed no change from January.

New heat records for February were established in the Southwest, greatly disappointing members of the operating fraternity. Demand, which opened strong at the first of the month, quickly slowed up. The only price change, however, was in Kansas shovel lump and nut, which slumped from $3.50 at the first of the month to $3.25 at the last, with some sales reported as low as $3. Kansas deep-shaft lump, as a result of curtailed production, continued to sell up to $4.25.

MILD weather in the month of February operated to depress the demand for domestic and steam sizes of Colorado coals. "No bills," particularly on nut coal, increased to such a point as to endanger production. The sluggish market curtailed the weekly running time to about 60-65 per cent, with no interruptions in labor or transportation. Prices were unchanged from January.

Operators, jobbers, and retailers were hit by a sharp curtailment in the demand for domestic sizes which struck the Louisville market in the last part of February. Householders, gambling on the prospects for an early spring, bought only in one- and two-ton lots, slowing up the movement all along the line. Prices, however, were well maintained, the operators being of the general opinion that reductions would not aid the market. A little price-cutting was reported at times, however.

Screenings assumed a more favorable position with the slackening in demand for prepared sizes. In western Kentucky, with practically all the available supply moving on contracts, spot buyers were forced to bid against one another or take mine run. Quotations advanced from 30c.@40c. at the first of the month to 60c.@75c. at the last, with indications of further increases in the near future. In eastern Kentucky, screenings sold as low as 40c. at mid-month, but little could be had at as low as 60c. at the last, with $1 in sight. Mine-run was quiet.

Streakiness as a result of weather conditions featured the Cincinnati market in February. Cold snaps that failed to hold and warm weather that turned roads into mud paths in rural sections, thus impeding deliveries, were the chief causes of complaint. Each sign of a cold snap brough in its train increases in production, followed by distress coal to clog the market. In the first week of the month, the tonnage moving through the Cincinnati gateway was nearly 3,000 cars above normal, but curtailed working time in the Hazard and Harlan districts of Kentucky and in West Virginia brought deliveries down to normal.

DIFFERENCES as to stable prices on smokeless coal continued to disturb the market. With lump and egg at $3, those selling on contract thought that a basic price had been reached. But spot sales on lump slumped to $2.50 and egg went down to $2.75. Stove was in better condition. Mine-run, despite a circular price of $2.25, sold largely at $1.75@$2. Even screenings, the one strong spot in the market, softened as March approached.

Large domestic sizes were the leaders in the high-volatile market and were able to maintain an even price level over the month. Bituminous egg, a highly favored coal a few years ago, was a drug on the market from mid-month on, largely because of overproduction. Distress tonnage kept turning up at $1.25@$1.35 to help depress the price. Heavy production at the first of the month caused the price of slack to slump a little, but curtailment of output at the last resulted in a return to its former position. Retail business was good until the last of the month, with prices as follows: smokeless lump, $8.75@$9; mine-run, $6@$6.25; bituminous lump, $6@$7; and screenings, $3.75@$4.25.

Unfavorable weather conditions after the middle of February caused a marked slackening in the demand for domestic sizes in the Columbus market and depressed the prices. Movement through the city was reduced to the lowest point in years, and even the steam market was affected to some extent, though slack strengthened materially under the influence of curtailed production. The retail trade was practically stagnant at the end of the month, though prices did not decline. Quotations were as follows: smokeless lump and egg, $8.75; stove, $7.75; premium splint lump, $6.75@$7.25; egg, $6.25, ordinary splint lump, $6.25@$6.75; egg, $6; Hocking and Pomeroy lump, $5.50@$5.75. All prices are subject to a discount of 50c. for prompt payment.

Steam coals moved fairly steadily on contracts, especially to utilities, railroads, and iron and steel plants. General manufacturing also accounted for its usual tonnage. There was little dis-

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

LOW-VOLATILE, EASTERN	Market Quoted	Week Ended Feb. 1, 1930	Feb. 8, 1930	Feb. 15, 1930	Feb. 22, 1930
Smokeless lump	Columbus	$3.25@$3.75	$3.25@$3.50	$3.00@$3.25	$2.75@$3.25
Smokeless mine-run	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	1.85@ 2.00
Smokeless screenings	Columbus	1.50@ 1.65	1.40@ 1.60	1.35@ 1.50	1.35@ 1.50
Smokeless lump	Chicago	2.50@ 3.50	2.25@ 3.50	2.25@ 3.50	2.25@ 3.25
Smokeless mine-run	Chicago	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	1.75@ 2.25
Smokeless lump	Cincinnati	2.75@ 3.25	2.75@ 3.25	2.75@ 3.25	2.50@ 3.25
Smokeless mine-run	Cincinnati	1.85@ 2.25	1.85@ 2.25	1.75@ 2.25	1.75@ 2.25
Smokeless screenings	Cincinnati	1.50	1.50	1.45@ 1.50	1.50
*Smokeless mine-run	Boston	4.50@ 4.60	4.40@ 4.50	4.25@ 4.35	4.20@ 4.30
Clearfield mine-run	Boston	1.40@ 1.75	1.40@ 1.75	1.35@ 1.70	1.35@ 1.70
Cambria mine-run	Boston	1.65@ 2.00	1.60@ 2.00	1.60@ 2.00	1.60@ 2.00
Somerset mine-run	Boston	1.50@ 1.80	1.50@ 1.80	1.45@ 1.75	1.45@ 1.75
Pool 1 (Navy Standard)	New York	2.30@ 2.50	2.30@ 2.50	2.20@ 2.30	2.20@ 2.30
Pool 1 (Navy Standard)	Philadelphia	2.35@ 2.60	2.35@ 2.60	2.35@ 2.60	2.35@ 2.60
Pool 9 (super. low. vol.)	New York	1.90@ 2.25	1.90@ 2.25	1.90@ 2.25	1.90@ 2.25
Pool 9 (super. low. vol.)	Philadelphia	1.90@ 2.15	1.90@ 2.15	1.90@ 2.15	1.90@ 2.15
Pool 10 (h. gr. low. vol.)	New York	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85	1.75@ 1.85
Pool 10 (h. gr. low. vol.)	Philadelphia	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95	1.75@ 1.95
Pool 11 (low. vol.)	New York	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75	1.60@ 1.75
Pool 11 (low. vol.)	Philadelphia	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75	1.55@ 1.75
HIGH-VOLATILE, EASTERN					
Pool 54-64 (gas and st.)	New York	$1.10@$1.30	$1.10@$1.30	$1.10@$1.30	$1.10@$1.30
Pool 54-64 (gas and st.)	Philadelphia	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35	1.15@ 1.35
Pittsburgh sc d gas	Pittsburgh	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90	1.75@ 1.90
Pittsburgh gas mine-run	Pittsburgh	1.60@ 1.70	1.60@ 1.70	1.60@ 1.70	1.60@ 1.75
Pittsburgh mine-run	Pittsburgh	1.40@ 1.60	1.40@ 1.60	1.40@ 1.70	1.40@ 1.65
Pittsburgh slack	Pittsburgh	.80@ .90	.80@ .90	.80@ 1.00	.90@ 1.10
Kanawha lump	Columbus	2.00@ 2.35	2.00@ 2.35	2.00@ 2.25	1.90@ 2.25
Kanawha mine-run	Columbus	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
Kanawha screenings	Columbus	.75@ 1.00	.75@ 1.00	.75@ 1.00	.80@ 1.00
W. Va. lump	Cincinnati	1.85@ 2.75	1.85@ 2.75	1.75@ 2.75	1.75@ 2.75
W. Va. gas mine-run	Cincinnati	1.40@ 1.60	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
W. Va. steam mine-run	Cincinnati	1.15@ 1.35	1.10@ 1.35	1.10@ 1.35	1.15@ 1.35
W. Va. screenings	Cincinaati	.60@ 1.00	.50@ 1.00	.50@ 1.00	.50@ 1.00
Hocking lump	Columbus	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Hocking mine-run	Columbus	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60	1.35@ 1.60
Hocking screenings	Columbus	.70@ .90	.75@ .90	.75@ .90	.75@ .90

*Gross tons, f.o.b. vessel, Hampton Roads.

position to increase the present low reserves, however. Contracting occupied a major share of the attention of the trade, with a number of inquiries received. Indications point to slight increase in the screenings prices from all fields. Operations in the Hocking, Cambridge, Jackson and Pomeroy fields of Ohio dropped off considerably in February. Demand for Ohio slack continued firm with no oversupply.

DOMESTIC and railroad demand in the Pittsburgh market declined gradually over the month of February, though industrial users manifested an increased interest toward the last. Accumulations of slack were satisfactorily disposed of at the last of the month with the decline in domestic shipments, and prices showed a little stronger tone. Domestic prices declined a level of $2.25 at the first of the month to $2.10@$2.25 at the last. Industrial demand continued to be slightly subnormal.

The central Pennsylvania market was quiet during the month of February, with an inactive demand. Slightly heavier production brought in its train an increase in the number of "no bills" from about 1,400 to about 1,900. Prices showed little change from January, quotations at the last of the month being as follows: Pools 11 and 18, $1.60@$1.70; Pool 10, $1.75@$1.90; Pool 9, $1.90@$2; Pool 7, $2.10@$2.25; Pool 1, $2.35@$2.50.

In New England, the steam coal market in February suffered from overproduction on the part of the smokeless operators. As a result prices f.o.b. vessel at Norfolk and Newport News slumped sharply, with even the choicer grades of mine-run quoted at $4.25, and nut-and-slack a drug on the market at $3.85. Strenuous efforts were made in the last days of the month to dump shipments, but with little success.

Though New England dealers were not under the same pressure to move tonnage as the operators, there were more offerings than were good for prices. F.o.b. cars at Boston and Providence, Navy Standard mine-run was quoted at $5.70, and No. 1 nut-and-slack at $5.25. Forcing cargoes on the market resulted in some sales at even lower figures. Good quality all-rail coals from Pennsylvania were in a little better demand, with $2 as a maximum on smokeless and $1.25 on high-volatile.

During the greater part of February, and especially the latter half, weather conditions had a markedly adverse effect on conditions in the Birmingham domestic market. Mines found it difficult to dispose of the tonnage made in filling steam orders and were, in some instances forced to stock it at the tipples. Retailers did not buy in proportion to their sales, evidencing a disposition to clean up their reserves in anticipation of the end of the coal year. Mine prices showed no change as compared to January, the sluggish demand having no effect on their general level.

Steam coal buying compared favorably with that in the preceding month, with some increase in shipments on railroad contracts. No trend was in evidence in the general industrial field and that part of the market was featureless. Demand for coking coal was normal, though some additional bunkering orders were filled during the month. Prices were unchanged from January.

Buyer indifference, helped to some extent by a slight recession in industrial activity, resulted in a dull market in New York in February. Smokeless coals manifested some activity at the beginning, as a result of demands from the interior, but fell off at the last. Prices were well maintained, with some cutting on distress shipments. Little interest was manifested in contracting.

Ups and downs in accordance with the vagaries of the weather featured the Philadelphia market in February, with the "downs" predominating. In addition, consumers, with the approach of April in mind, showed a disposition to curtail takings and failed to manifest any interest in replenishing reserves. While producers made some effort to line up contracts for the coming year, there seemed little likelihood of any increase in this business, as consumers are depending upon the spot market for supplies. Export demand fell off more than usual for the time of year with the cleaning up of seasonal business. Bunkering was the principal activity at tidewater and the total tonnage moved increased slightly. Prices were unchanged as compared to January, remaining the one unsatisfactory factor in the market.

Mild weather caused a continuance of the dull anthracite market in New York. A few slight cold snaps were not sufficient to enliven the demand to any extent. Large sizes remained a drug on the market, with buckwheat and pea manifesting the only activity. Retailers urged the operators to maintain winter prices until May 1, instead of announcing reductions on April 1, in the belief, in view of the mild weather of the last two months, that a longer heating period can be expected. Such a price policy was announced by a few companies and the others are expected to follow suit.

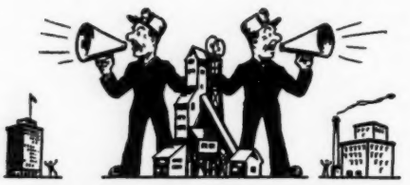
WITH good business up until the middle of February, the Philadelphia anthracite market received a jolt with the return of warm weather in the last half. As a result, there was an entire stoppage of consumer demand, with a corresponding reduction in running time at the mines. An announcement by some of the leading operators that winter prices would be maintained until May 1, failed to stimulate the expected buying, though stove was in fairly good demand; chestnut was active and pea gained in strength. The steam situation was favorable as a result of the demand for buckwheat. Curtailment in production accentuated the prevailing shortage in this size. An innovation in anthracite circles will be the sale of coal on a basis of a unit of 2,000 lb., instead of the gross tons of 2,240 lb. Prices will be scaled down accordingly.

Exports of anthracite and bituminous coal from the United States in January, the latest month for which figures are available, were 270,897 and 952,917 gross tons, respectively, as compared to 297,849 and 917,118 gross tons in the same month last year. Imports of anthracite and bituminous coal during the month of January were 50,311 and 30,886 gross tons, respectively, as compared to 48,343 and 45,913 gross tons in January, 1929.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

		Week Ended			
MIDDLE WEST	Market Quoted	Feb. 1, 1930	Feb. 8, 1930	Feb. 15, 1930	Feb. 22, 1930
Franklin, Ill. lump	Chicago	$3.15	$3.15	$3.15	$3.15
Franklin, Ill. mine-run	Chicago	2.15	2.15	2.15	2.15
Franklin, Ill. screenings	Chicago	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60	1.30@ 1.60
Central, Ill. lump	Chicago	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65	2.40@ 2.65
Central, Ill. mine-run	Chicago	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85	1.70@ 1.85
Central, Ill. screenings	Chicago	.35@ 1.00	.35@ 1.00	.50@ 1.00	.75@ 1.00
Ind. 4th Vein lump	Chicago	2.85@ 3.00	2.85@ 3.00	2.85@ 3.00	2.85@ 3.00
Ind 4th Vein mine-run	Chicago	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10	1.50@ 2.10
Ind. 4th Vein screenings	Chicago	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
Ind. 5th Vein lump	Chicago	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	1.75@ 2.20
Ind. 5th Vein mine-run	Chicago	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75	1.25@ 1.75
Ind. 5th Vein screenings	Chicago	.60@ .90	.60@ .90	.55@ .90	.65@ 1.00
Mount Olive lump	St. Louis	2.50	2.50	2.50	2.50
Mount Olive mine-run	St. Louis	1.75	1.75	1.75	1.75
Mount Olive screenings	St. Louis	.50@ .90	.35@ .90	.40@ .75	.60@ 1.00
Standard lump	St. Louis	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
Standard mine-run	St. Louis	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75	1.65@ 1.75
Standard screenings	St. Louis	.40@ .60	.25@ .60	.30@ .60	.35@ .75
West Ky. block	Louisville	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25
West Ky. mine-run	Louisville	.90@ 1.15	.90@ 1.15	.90@ 1.15	.90@ 1.15
West Ky. screenings	Louisville	.35@ .50	.35@ .50	.40@ .60	.60@ .75
West Ky. block	Chicago	2.00@ 2.25	2.00@ 2.25	2.00@ 2.25	1.75@ 2.00
West Ky. mine-run	Chicago	1.00@ 1.15	.95@ 1.10	.90@ 1.05	.85@ 1.00
SOUTH AND SOUTHWEST					
Big Seam lump	Birmingham	$2.00@$2.25	$2.00@$2.25	$2.00@$2.25	$2.00@$2.25
Big Seam mine-run	Birmingham	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50	1.35@ 1.50
Big Seam (washed)	Birmingham	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75	1.50@ 1.75
S. E. Ky. lump	Chicago	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75	2.00@ 2.50
S. E. Ky. mine-run	Chicago	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60	1.40@ 1.60
S. E. Ky. lump	Louisville	2.25@ 2.75	2.25@ 2.75	2.25@ 2.75	2.00@ 2.50
S. E. Ky. mine-run	Louisville	1.35@ 1.60	1.35@ 1.65	1.35@ 1.65	1.35@ 1.65
S. E. Ky. screenings	Louisville	.80@ 1.15	.75@ 1.00	.60@ 1.15	.60@ 1.15
S. E. Ky. lump	Cincinnati	2.00@ 2.75	2.00@ 2.75	2.00@ 2.75	1.85@ 2.75
S. E. Ky. mine-run	Cincinnati	1.15@ 1.60	1.10@ 1.60	1.10@ 1.60	1.10@ 1.50
S. E. Ky. screenings	Cincinnati	.60@ 1.00	.50@ 1.00	.50@ 1.00	.60@ 1.00
Kansas shaft lump	Kansas City	3.75@ 4.25	3.75@ 4.25	3.75@ 4.25	3.75@ 4.25
Kansas strip lump	Kansas City	3.50	3.50	3.00@ 3.25	3.00@ 3.25
Kansas mine-run	Kansas City	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75	2.50@ 2.75
Kansas crushed mine-run	Kansas City	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80	1.60@ 1.80
Kansas screenings	Kansas City	1.50	1.50	1.50	1.50

WORD from the FIELD



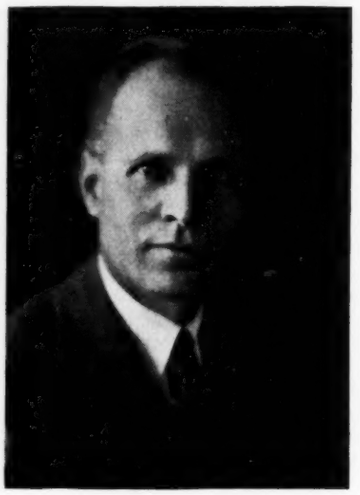
Midwest Bituminous Conference To Promote Coal Use

Marking the beginning of a series of annual meetings, the Midwest Bituminous Coal Conference will be held at Purdue University, Lafayette, Ind., April 9-11, for the benefit of the coal consumers of the Middle West. The conference is sponsored by the Engineering Extension Department, Purdue University; the Coal Trade Association of Indiana, and the Illinois Coal Bureau, in collaboration with the fuels division of the American Society of Mechanical Engineers, and will be devoted to the determination of means of extending the use of Illinois and Indiana coals, as well as increasing the economies derived from their use. Two main subjects, "Economic Justification for the Use of Indiana and Illinois coals in the Middle West" and "Availability, Classification and Suitability of Indiana Coals for Various Uses," will be discussed April 9. Sessions on April 10 will be devoted to a discussion of mechanical devices for burning Illinois and Indiana coals, as well as to a consideration of the retailers' problems. On April 11, delegates will take up the topic of "Reconditioning Existing Plants to Burn Illinois and Indiana Coals Economically and Smokelessly."

Safety Banquets Held

Climaxing the third year of safe operation, three employees' banquets and an official safety banquet were given by the New England Fuel & Transportation Co., Grant Town, W. Va., the latter held at the Fairmont Hotel, Fairmont, W. Va., Feb. 15. Employees to the number of 800 dined at affairs given at Grant Town and Everettville prior to the official dinner, which was attended by 150 company officials and guests. The latter was arranged by W. H. Forbes, safety engineer of the company, and D. T. Buckley, of the Boston (Mass.) office, was toastmaster.

Safety, particularly as applied to the mines of the New England Fuel & Transportation Co., was discussed by Capt. W. E. McKay, D. L. Brown, and Mr. Forbes, president, general superintendent, and safety engineer of the company, respectively; and A. B. Spencer, inspector-at-large, West Virginia Department of Mines, Morgantown, W. Va.; J. J. Forbes, U. S. Bureau of Mines, Pittsburgh, Pa., and Archie Forbes, safety engineer, Logan County Coal Corporation, Lundale, W. Va.



John C. Cosgrove

Heads New Coal Combine

John C. Cosgrove, Johnstown, Pa., president, West Virginia Coal & Coke Corporation, and chairman of the board, Cosgrove-Meehan Coal Corporation, has been named president of seven affiliated coal companies operating in northern West Virginia. The companies are as follows: Randolph-Barbour Coal Co., Braxton Independent Coal Co., Lewis Independent Coal Co., Gilmer-Kanawha Coal Co., Gilmer Independent Coal Co., Upshur-Meade Coal Co., Upshur-Washington Coal Co., and Upshur-Union Coal Co. In addition to electing Mr. Cosgrove president, the directors named V. F. Carraher, Cincinnati, Ohio, vice-president, and A. H. Crane, New York City, treasurer. The seven companies own approximately 100,000 acres of coal land in northern West Virginia.

Portsmouth By-Product Plant Sold to Wheeling Steel

Half interest in the Portsmouth By-Product Coke Co., with a plant at Portsmouth, Ohio, and mines at Freeburn, Ky., has been sold to the Wheeling Steel Corporation, Wheeling, W. Va., by the American Rolling Mill Co., Middletown, Ohio. This makes the purchasing company, which formerly held only a half interest, the sole owner of the By-Product company. No change will be made in the management.

Anthracite Freights Too High, Business Men Hear

Anthracite freight rates are in need of readjustment, was the contention of E. H. Suender, vice-president and general manager, Madeira-Hill anthracite interests, who spoke before the "Anthracite" meeting of the Scranton (Pa.) Chamber of Commerce, Feb. 21. Comparisons with the rates on bituminous coal, Mr. Suender asserted, showed a wide difference in favor of soft coal. Turning to general problems of the industry, he said that the object of the anthracite producers is to please the public, and that the miners and owners are now co-operating to build "anthracite spirit."

"We are interested in the success of the anthracite coal mines as much as the operators," was the statement of David W. Davis, international organizer, United Mine Workers, who expressed the hope that the present cordial relations between the two factions would not be disturbed by a strike. Dr. Joseph Noonan, president, Anthracite Co-Operative Association, pointed out the advantages of a human understanding of the industry.

Anthracite Shipments Decrease

Anthracite shipments in January, 1930, as reported to the Anthracite Bureau of Information, Philadelphia, Pa., were 5,405,788 gross tons, a decrease of 425,746 tons from the total for December, 1929, and 406,184 tons less than in January, 1929. Shipments by originating carriers for January, 1930, compared with the months of December and January, 1929, are as follows:

	Jan., 1930	Dec., 1929	Jan., 1929
Reading	1,149,275	1,157,152	1,165,139
Lehigh Valley	813,538	989,060	877,811
Central R.R. of New Jersey	514,375	560,885	540,893
Del., Lack. & Western	803,073	802,112	980,541
Delaware & Hudson	712,772	786,077	779,237
Pennsylvania	533,105	563,386	508,926
Erie	518,908	611,671	618,777
N. Y., Ontario & Western	156,499	142,172	130,494
Lehigh & New England	204,243	219,010	210,154
	5,405,788	5,831,534	5,811,972

Senate Defeats Oil Tariff

Proposals for a tariff on oil were defeated by the Senate, Feb. 28, by a vote of 39 to 27, despite the efforts of the Independent Petroleum Producers of America, backed up by the members

from Oklahoma; Senators Goff and Hatfield, of West Virginia; and Senator Robsion, of Kentucky. Briefs in support of a duty on oil also were presented to the Ways and Means Committee of the House of Representatives and the Finance Committee of the Senate by the National Coal Association late in 1929. It is thought that the issue will not be revived at the present time.

Utah Commission Prohibits "Open" Equipment

Only equipment approved by the U. S. Bureau of Mines may be used in "gassy" coal mines in Utah after Jan. 1, 1932, according to an order of the State Industrial Commission. Operators of "gassy" coal mines, under the order, are required to have an electrician, who shall be in daily contact with all such equipment used at the working face. Any repairs must be made above ground and the electrician must make a daily record of such equipment in use.

Stonega Makes Changes

Changes in the operating staff at various mines of the Stonega Coke & Coal Co., in the Big Stone Gap (Va.) region, consequent upon the elevation of Andrew H. Reeder, superintendent at Exeter, Va., to the position of general superintendent, are as follows: Harry W. Meadows, assistant superintendent at Roda., was transferred to Exeter to succeed Mr. Reeder; Guy K. Patrick, assistant superintendent at Derby, Va., was moved to Roda; G. Strale Tate, assistant superintendent at Imboden, Va., was shifted to Derby, and W. G. P. Black, formerly with the engineering department of the company, was made superintendent at Imboden.

Holmes Safety Council Started

A new council of the Holmes Safety Association has been organized in the Allegheny Valley section of the Pittsburgh district of Pennsylvania. Membership in the council includes workers employed in the mines of the following companies: Ford Collieries Co., Detroit, Mich.; Consumers Mining Co., Wheeling, W. Va.; Butler Consolidated Coal Co., Butler Pa.; Crucible Fuel Co., Pittsburgh, Pa.; Valley Camp Coal Co., Cleveland, Ohio; Hillman Coal & Coke Co., Pittsburgh, Pa.; Allegheny-Pittsburgh Coal Co., Pittsburgh, Pa., and the Republic Collieries Co., Youngstown, Ohio.

A Pennsylvania Civil Liberties Committee, with headquarters in Harrisburg, Pa., has been organized to conduct a state-wide campaign for action by the next State Legislature for the abolition of the coal and iron police and the curtailment of the powers of state police and sheriffs in time of strike, according to an announcement in New York City.

How to Make West Virginia Coal Mines Safer Is Conference Topic

TEN MEN representing coal companies which have made notable advances in accident prevention spoke at Charleston, W. Va., March 1, at an all-day meeting of state mine inspectors and company officials called by Robert M. Lambie, chief of the State Department of Mines. The principal object of the meeting was to discuss dates and plans for the first-aid meets, but most of the time was given over to the talks on ways and means of promoting safer operation of mines. Chief Lambie announced that State Safety Day will be held at Wheeling, Sept. 12 and 13, during the State Fair.

After considerable discussion the meeting approved a ruling that judges in the first-aid contests at all district meets and at the state meet shall point out to the team members the reasons for all discounts in ratings.

District meet dates were announced as follows: Williamson, June 21; Beckley, July 4; Morgantown, July 19; Wheeling, Aug. 2; Montgomery, Aug. 9; Welch, Aug. 16; Jacksons Mill, Aug. 23; Logan, Aug. 30; and Madison, Sept. 1. The Jacksons Mill date may be changed later to Aug. 16. Company meets were announced as follows: New River Co., Scarbro, June 14; New England Fuel & Transportation Co., Grant Town, June 15; Koppers Coal Co., Montgomery, June 28; Carbon Fuel Co., Decota, July 4; and American Rolling Mill Co., Nellis, Aug. 2. Dates have not been fixed for the meets of the Consolidation Coal Co. and the Bethlehem Mines Corporation.

The Charleston meeting went on record as favoring a change in the name of the state mining department from "Department of Mines" to "Department of Mineral Resources."

In his introductory remarks as chairman of the meeting, Mr. Lambie pointed out that personal injuries cost 2.9c. per ton in the state last year. Extending his remarks to deaths from gas explosions, he said that mine doors have no place according to present standards. "So long as we have mine doors we will have interruptions to ventilation, and lack of ventilation is the primary cause of gas explosions." He urged that, when ordering new equipment, operators ask the manufacturers to provide means for men to ride in safety. This was understood as applying especially to self-propelling mining machines.

C. L. Wilson, safety engineer of the New River & Pocahontas Consolidated Coal Co., Philadelphia, chose as his subject "What It Means to Be a Minister of Safety." He touched briefly on the relations of management, engineering, and supervision to safer production of coal. It is highly important, he stated, that the safety engineer have sufficient first-hand knowledge of each phase of operation to talk convincingly to the officials of each department concerning changes to safer practices. He further emphasized that "a man finding a dangerous condition shall stay there until the condition is corrected."

"Responsibility of Management in Accident Prevention," was the subject of T. E. Lightfoot, safety director of mines of the Koppers Coal Co. Responsibility for accidents, he said, falls on three classes—the injured man, his fellow workman, and the management. The latter is the most important cog in the machine, and the safety director must not fail in his duty to tell any official clearly and plainly if he is responsible for an accident, and it is equally important that the director stick by his guns regardless of pressure.

Mr. Dodd, safety inspector, Island Creek Coal Co., outlined the safety club organization to which he attributes much of the company's improvement in safety records. Previous to about five years ago, when the safety clubs were formed, the company mined about 400,000 tons per fatal accident; now the average for several years has been something better than a million and for the year 1928 it was 2,700,000 tons. In the last four years both lost-time and fatal accidents have been reduced 60 per cent.

There is a club at each mine and every man must belong and attend a certain percentage of the meetings. Special safety police are appointed to report violations, but it is the duty of every man to report any violation he sees. Trials for violations are conducted as in a justice's court and fines are imposed when guilt is proved. The general manager requires that accurate reports of the proceedings of each meeting be sent to his office.

"Safety in coal mining is only operation as it should be," and "the safety department must use the big stick if you have it, and if you don't it is 'just too bad'," were observations of F. E. Bedale, director of safety, Consolidation Coal Co. Success in safety betterment comes only with persistent effort and by having the full backing of the management. Standardization, education, discipline, and co-operation have been the channels of improvement at Consolidation mines. In the West Virginia division of the company, the tons per fatality has increased steadily from 333,000 in 1926 to 1,358,000 in 1929. In 1927 the company issued safety standards, which the officials wished later they had named "Operating Standards." Once each year every official must pass a safety standard examination. From accurate records of accidents divided into 400 classifications the company is now able to see which types of machinery are dangerous, and take this into account when buying new equipment.

C. R. Stahl, division superintendent,

C. C. B. Smokeless Coal Co., and president, Winding Gulf Operators' Association, exhibited cards which mines in that association now issue as safety certificates to employees who make application for them and who can qualify before a committee as having worked without an accident for a year. The certificates are good for 90 days and can be revoked at any time. Mines in the district will not hire a man from within the district who cannot exhibit a safety certificate. The practice started Jan. 1.

C. W. Nelson, of the Ingersoll-Rand Co., New York, talked on the possibilities of using pneumatic picks for pillar work in the smokeless fields. Such equipment, he claimed, promotes safety by eliminating electric equipment from the working place and by making it possible to set timbers against the face.

Industrial Coal Reserves Rise To 30 Days' Supply

Stocks of anthracite and bituminous coal in the hands of industrial consumers in the United States and Canada on Feb. 1 were 37,078,000 net tons, according to the monthly report of the National Association of Purchasing Agents, Inc. This figure is equal to 30 days' supply, based on the January consumption of 38,512,000 net tons. With industrial consumption running lower than last year and the possibility of a drastic cut in stocks in the month of March, as in last year, there is a strong likelihood that March production will be closer to 40,000,000 tons than the estimate of 44,000,000 to 46,000,000 tons given by the association.

Day's Supply of Bituminous Coal in Various U. S. Industries

Byproduct coke	28	Railroads	22
Electric utilities	43	Steel mills	27
Coal gas plants	57	Other industries	29
Average total bituminous stocks throughout the United States			28

Estimates of Output, Consumption and Stocks in Net Tons

	United States Production	Industrial Consumption	On Hand in Industries
January, 1929	58,500,000	39,518,000	41,292,000
February	54,000,000	38,175,000	40,808,000
March	44,391,000	40,566,000	40,108,000
April	43,329,000	37,750,000	33,385,000
May	46,480,000	37,298,000	33,468,000
June	42,969,000	34,485,000	31,282,000
July	45,635,000	35,040,000	31,415,000
August	49,843,000	34,886,000	32,712,000
September	51,307,000	35,960,000	34,289,000
October	59,567,000	39,482,000	36,107,000
November	51,719,000	38,747,000	37,313,000
December	53,858,000	*38,581,000	37,512,000
January, 1930	56,816,000	38,512,000	*39,007,000
Feb. 1	.....	.....	37,078,000

*Revised.

Commercial stocks of bituminous coal, used largely for industrial purposes, amounted to 40,300,000 tons on Jan. 1, 1930, according to the U. S. Bureau of Mines. In comparison with the quantity on hand at the beginning of the previous quarter, this is an increase of 2,800,000 tons but is 1,500,000 tons less than the quantity in storage last year.

With colder weather, the rate of consumption shows the expected seasonal increase. During the last two months of 1929 the rate of home consumption averaged 10,782,000 tons a week. Exports averaged 330,000 tons a week, and total consumption plus exports was 11,112,000 tons. When compared with the corresponding period of 1928, the rate of consumption plus exports shows an increase of 148,000 tons a week, or a gain of 1.3 per cent.

In addition to the quantity in the hands of commercial consumers on Jan. 1, 1930, there were 8,026,000 tons of bituminous coal on the docks of Lake Superior and Lake Michigan, as compared with 9,897,000 tons on Oct. 1, and 8,318,000 tons on Jan. 1 a year ago. Stocks of anthracite in retail yards on Jan. 1 were slightly less than on Oct. 1, the date of the last survey, and were also less than on Jan. 1 last year.

Disallow Compensation Reserve As Deduction From Income

Deductions from gross income reported for taxation purposes of amounts credited to a reserve for workmen's compensation insurance; certain expenditures for machinery and equipment; expenditures for house construction to keep up the output of the mine, and expenditures for repairs to houses which can be classed as part of the original building cost, are not allowable, according to the decision of the U. S. Board of Tax Appeals in the case of the Potts Run Coal Co., Clearfield, Pa.

Under the laws of Pennsylvania, a coal company is not required to insure in the state compensation fund if it can show that it is financially able to pay such compensation to employees as may arise. The Board, however, said in the Potts Run case, that "Setting up the reserve was no doubt good business policy, but it was entirely voluntary on the part of the petitioner." As a safeguard "against contingent future liability and nothing more," it was not deductible from income.

Deductions were claimed by the coal company for the purchase of mining machines, mine cars, rails, pumps, hoists, and a fan motor, of which expenditures for the mine cars and rails alone were allowed. The Board stated in the decision that, with the exception of the mine cars and rails, the machinery purchased "had a useful life of several years," and that "while this machinery may not have increased the amount of coal produced, some of it did decrease the cost of production." Consequently, the Board, in line with a number of previous decisions, held that such expenditures were not deductible.

The Potts Run Coal Co., in 1918, during the World War period, found it necessary to construct a number of additional houses to maintain the production of the mine, the cost of which it claimed should be deducted from income. No attempt was made to amortize their cost, and the houses were used for a number of years and, though now standing empty, are, "inferentially at least," usable. The decision of the Board was that "such building cost should be capitalized and an appropriate depreciation rate applied." The Board also decided that repairs to the above houses, the cost of which the coal company claimed should be deducted from income, were largely of a permanent character with a useful life of more than one year and consequently the expense incurred was not allowable.

Bondholders to Reorganize Carnegie Coal Co.

First steps in the reorganization of the Carnegie Coal Co., Pittsburgh, Pa., by the sale of the company's property under foreclosure proceedings will be taken by the first mortgage bondholders about March 25. The property was valued at $15,000,000 in 1923, and includes 21,500 acres of coal land in Pennsylvania and West Virginia, as well as docks and retail yards.

The total indebtedness of the company at the present time is $7,500,000. J. T. M. Stoneroad, president, Harmon Creek Coal Co., and chairman of the bondholders' protective committee, stated that the steps were taken in the interest of the bondholders and that they would bid the property in unless some other party bid enough to allow the holders to come out on their investment.

To File Bill of Foreclosure

Permission to file an equity bill for the foreclosure of the first mortgage of $5,000,000 on the properties of the South Penn Collieries Co., Scranton, Pa., has been granted the Pennsylvania Co. for Insurance on Lives and Granting Annuities, as trustee for the bondholders. Foreclosure of a second mortgage for $2,000,000 was instituted by the Girard Trust Co., in 1927, as trustee for the holders of those bonds. Interest on the first mortgage was paid until Nov. 1, 1929, and the company also has defaulted on sinking fund and tax payments. Bonds for $3,758,500 are outstanding.

Robert Buchanan, Scranton, Pa., the receiver, has been endeavoring to effect a reorganization and is suing the estate of the late Governor Sproul, one of the promoters of the company, and his financial agent, for the recovery of more than $1,000,000, alleged to have been improperly paid to them.

Gas Explosions Kill Seven

Four men were killed, three others were injured, and seven were overcome by afterdamp in an explosion of gas in the Lytle mine of the Lytle Coal Co., near Minersville, Pa., Feb. 25.

Three men were killed and three others were burned in a gas explosion in the Lincoln mine of the Philadelphia & Reading Coal & Iron Co., near Pottsville, Pa., Feb. 7. According to officials of the company, the explosion was local in character.

Comprehensive Program Offered Operating Men At Mining Congress Convention

A COMPREHENSIVE program, embracing many phases of production, and including papers on mechanical mining, coal cleaning and preparation, personnel training, cost accounting, accident prevention and safety measures, transportation and maintenance, with a general review of conditions in the industry during the past year, has been announced for the Seventh Annual Convention of Practical Coal Operating Officials to be held in Cincinnati, Ohio, May 5-9 under the auspices of the Manufacturers' Division of the American Mining Congress.

Dr. L. E. Young, vice-president, Pittsburgh Coal Co., will be chairman of the opening session, May 5, when the following papers will be presented:

Dr. L. E. Young

"Mechanized Mining," by G. B. Southward, mechanization engineer, American Mining Congress; "Statistics on Mechanized Mining," by F. G. Tryon, U. S. Bureau of Mines; "Developments in Anthracite," by a speaker to be selected; "Development in Fuel Utilization," by Howard N. Eavenson, of Eavenson, Alford & Hicks, Pittsburgh, Pa., "Developments in Strip Mining in the United States," by K. A. Spencer, Pittsburg & Midway Coal Mining Co.; "Developments in Mining Machinery in the United States and Europe," by W. H. Rastall, U. S. Department of Commerce.

Mechanized mining will be discussed at the Tuesday morning session, May 6, and papers on this subject will be as follows: "Developments of Mechanized Face Preparation in Anthracite"; "Keeping Costs and Statistics in Connection With Mechanized Loading," and "Gathering Methods Developed for Mechanized Loading." The last mentioned will be presented by R. J. Oldham, Centralia Coal Co. In the afternoon, the program will take up transportation and maintenance problems, with papers on "Large Locomotives in Long Haulage"; "Maintenance, Repairs and Lubrication"; "Increasing Capacity of Mine Cars"; and "Locomotive Haulage and Strip Mining," the latter to be read by W. S. Rausch, mining engineer, Lehigh Navigation Coal Co.

Personnel training will be featured at the Wednesday morning session, with addresses on "Training Men at the Face," "Utilizing the Mine School Graduates," "Developing Bosses and Coaching Men (Anthracite)." Dr. J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines, will present "A National Survey of What Is Being Done by Industry in Training Men."

Mechanized mining in thin seams is scheduled for the Wednesday afternoon session. R. V. Clay, assistant general manager, Wheeling & Lake Erie Coal Mining Co., will discuss "Entry Development With Conveyors." "Conveyors in Room and Pillar Operation," will be the theme of a paper by George J. Krebs, superintendent, Reading Iron Co.

Earl H. McAlpin, mining engineer, of Haileyville, Okla., will review "Long-Face and Longwall Mining Methods." "Conveyor Mining in the Anthracite Field" is to be discussed by a speaker as yet unnamed.

Cleaning and preparation will be discussed Thursday morning. The program includes a paper on "Cleaning Coal at the New River Co.," by M. L. Garvey, general manager, New River Co., and "Cleaning Coal at the Carswell Mine of the Koppers Coal Co." Mechanized mining in high coal will be the subject of the afternoon session. The subjects are: "Development and Operation With Mechanical Loaders," "Development and Operation With Pit Car Loaders," "Operation With Conveyors," and "Stripping in the Tri-State Field." W. J. Jenkins, president, Consolidated Coal Co. of St. Louis, will be chairman of this session.

For the session on accident prevention, Friday morning, the program includes papers on "Methods Employed in Developing, Maintaining, and Enforcing Safety Codes"; "Relation of Mechanical Mining to Safety," by Dr. Young; "Physical Examinations in Relation to Accident Prevention," by T. E. Lightfoot, Koppers Co.; "The Safety Award Winners (How They Do It)"; and "Rock Dust Practice." Following Dr. Young's paper, brief summaries on safety results at their companies will be made by S. W. Blakslee, general manager, Pennsylvania Coal & Coke Corporation; F. S. Pfahler, vice-president and general manager, Superior Coal Co.; and J. W. Stedelin, vice-president and superintendent, Marion County Coal Co. J. D. Zook, president Illinois Coal Operators' Labor Association, also will participate in this discussion. The session will be presided over by E. B. Leisenring, chairman of the board, Stonega Coke & Coal Co.

A feature of the closing session of the conference, on Friday afternoon, will be a motion picture film illustrating 100 per cent mechanization of the modern mine and described during its showing by E. J. Weimer, superintendent, Wildwood Mine, Butler Consolidated Coal Co. "A 100 Per Cent Pit Car Loader Operation" will be discussed by Mr. Pfahler. Papers also are scheduled on "A 100 Per Cent Conveyor or Scraper Operation (Anthracite)"; and "Modern Coal Stripping." Ira Clemens, president, Commercial Fuel Co., will preside as chairman.

The national exposition of coal mining equipment, held in connection with the convention, will be the largest of its kind. There will be over 100 exhibitors displaying all types of mining machinery and equipment on 20,950 sq.ft. of floor space in the north and south wings of the Cincinnati Auditorium flanking the convention hall, where the technical meetings will be held.

F. G. Tryon

Six manufacturers will exhibit bearings; two companies, drilling machines; fifteen companies, electrical equipment; four companies, explosives; twenty-nine companies, haulage equipment and supplies; eight companies, hoists and dumps; five companies, lamps; eighteen companies, loaders, conveyors, and scrapers; five companies, lubricants; four companies, mechanical power transmission; one company, commercial coins; one company, wood treating; fifteen companies, preparation; four companies, pumps and piping; five companies, safety; two companies, testing and weighing equipment; two companies, ventilating; six companies, wire rope; and four companies, publications.

The program committee charged with all arrangements is composed of the following members: P. C. Thomas, general manager of mines, Koppers Co., is chairman of the program committee in charge of the convention, and Mrs. E. R. Coombes, assistant to the secretary of the American Mining Congress, is secretary. Assisting this committee is an advisory committee including Paul Weir, Dr. L. E. Young, George B.

Harrington, W. L. Affelder, Ezra Van Horn, and Newell G. Alford. State and district members of the program committee are: D. A. Thomas, Alabama; Franklin Bache and V. C. Robbins, Arkansas and Oklahoma; R. L. Hair and B. W. Snodgrass, Colorado; F. S. Pfahler, and G. C. McFadden, Illinois; C. J. Fletcher, Indiana; K. A. Spencer and Ira Clemens, Kansas, Missouri, and Iowa; W. G. Duncan, Jr., and L. B. Abbott, Kentucky; R. P. Maloney, Maryland; Horace Moses, New Mexico; R. V. Clay, Ohio; R. E. Hobart, Pennsylvania (anthracite); S. W. Blakslee, George J. Krebs, Thomas Dawson, and M. B. Cooper, Pennsylvania (bituminous); George A. Schultz, Utah; J. D. Rogers and Lee Long, Virginia; P. C. Graney and Thomas G. Fear, West Virginia; George B. Pryde, Wyoming.

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Federal Control Advocated For Coal Industry

Commenting on unemployment in the United States, Secretary of Labor Davis, speaking over station WMAL, Washington, D. C., Feb. 13, in the National Radio Forum arranged by the Washington *Evening Star* and sponsored by the National Broadcasting Co., advocated federal control of the coal mining industry, to stabilize employment and make the business profitable. He asserted that the coal industry furnished a "glaring example" of the overdevelopment and overproduction characterizing industry in general; that there were 200,000 more miners than are needed to produce the country's coal supply, most of whom are out of work or work only part time; that towns in which these workers live represent a loss in investment to the business men, and that the buying power of these coal-mine employees is greatly reduced. "We could take this one industry," he remarked, "and show what can be done to stabilize employment and make the business profitable. If there are laws that stand in the way, I am sure that Congress would amend them."

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Five Companies Consolidate Sales Departments

The sales departments of five coal companies operating in the Pittsburgh district and northern West Virginia have been consolidated to eliminate the usual stumbling block to a merger—the inability to arrive at an agreement on the valuations of the properties. Involved in the merger are the Continental Coal Co., Fairmount, W. Va., and Henderson Coal Co., Chartiers Coal & Coke Co., Duquesne Coal & Coke Co., and Superior Mining Co., all of Pittsburgh, Pa. The centralized agency, which is the sales department of the Continental company, with offices in Pittsburgh, Pa., will handle in excess of 7,500,000 tons annually under the new plan. Branches will be established in a number of Eastern cities.

Thin Margins Compel Operating Efficiency, Bockus Tells Engineering Group

MARGINS of profit in bituminous coal—where any exist—are so thin that the producer has no choice but to practice efficiency, declared C. E. Bockus, president of the National Coal Association, in a luncheon address before the Coal and Coke Division of the American Institute of Mining and Metallurgical Engineers, at New York, Feb. 17. The speaker paid a tribute to the contributions to progress in mining made by the engineering profession and looked for further help from that source. The most pressing problem now, however, is one of adequate sales realizations.

In pre-war years, Mr. Bockus pointed out, soft-coal production in the United States had steadily climbed until a potential capacity approximating 750,000,000 tons per year had been reached. Since the war, the average output has been slightly in excess of 505,000,000 tons. Had it not been for the competition of substitute fuels and the remarkable increase in efficiency in fuel consumption since 1915, current requirements might demand a potential mine capacity of 800,000,000 tons.

"Now that shows the picture," continued Mr. Bockus. "Demand now varying from between 8,000,000 to over 11,500,000 tons per week, just over 500,000,000 tons per year, potential mining capacity 800,000,000 tons, and you have a surplus capacity that has drawn the average of prices below the cost of production, with any fair recompense for the capital expended in the industry.

"Anyone can guess at the amount invested per ton produced. Frankly I have tried my hand at guessing, and I am Yankee born. Let us say $3 capital investment per ton of potential production, and I have never heard of any guess so low as that, but I have tried to eliminate entirely the factor of large areas of coal lands held for the future, and the extravagance of war-time construction. Let us be moderate and say the coal producer is at least entitled to the lowest legal rate of interest, 6 per cent. Then he would have to make on 500,000,000 tons production 29c. per ton over his total operating and selling costs. It is needless for me to say he does not.

"What is the remedy? Is it always to be the law of the jungle, more politely spoken of as the survival of the fittest? That law is working, but slowly. Companies fail, stockholders are wiped out, mortgage bond holders get a few cents on the dollar. Recently a block of first mortgage coal bonds sold for 14c. on the dollar. After the sheriff finishes, the failed mines only too often start again with a capital investment of practically nothing. It is a long time that a solvent company has to wait for the uneconomic, unreasonable, and unfair competition of such a character to commit complete suicide. The industry must solve that problem—its greatest problem—for itself. I am one of those who believe the government more often sprags the wheels than helps to move the load.

"Engineering can help. There probably are still ways in which methods of mining and preparation can be bettered, and such a coal division as your organization is planning to set up might render valuable service in this technical field. Moreover, I want to take this occasion to recognize the value of the assistance which members of your organization have already given to the industry. Thanks to their inventive genius, the bituminous coal industry right now, from the production end, is not inefficient.

"Paying a minimum of $4 for eight hours of relatively unskilled labor, any producer who can mine, haul underground a mile or more, clean, prepare, size, set aside proper depreciation and depletion on 15 lb. of anything for one cent, cannot be inefficient. There is not margin enough there for much inefficiency.

"JUST how much can be saved? At a mine with which I am familiar, the total cost of loading coal underground, with a fair rate of operation, is 39c. per ton. This does not include undercutting or timber setting but does cover shoveling into car, cleaning at the face, and yardage for slate handling. In my opinion, an inch of slate is equal in time and cost to 5 or 6 in. of coal. The savings by mechanical loading in that mine must come, therefore, from that 39c. The total cost of haulage, including upkeep of haulageways, motor repairs, etc., is 19c. That is the figure on which conveyors have to work.

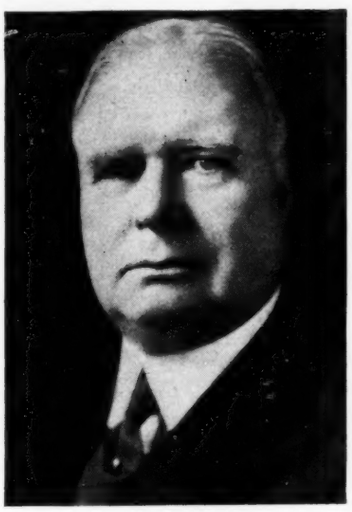
"While, as I have said, there is undoubtedly room for further improvement in the mechanical phases of mine operation, the limitations under which such improvements must operate should be clearly recognized. I have already pointed out that the margin of cost which can be affected by the use of mechanical loading and conveying contrivances is very small. There are further limitations relating to the natural condition of the property to be developed to which I may briefly refer.

"The completely mechanized mine has to have relatively good mining conditions. For success the seam has to be reasonably clean, and the roof and floor good. If coal carries partings, and most seams do, those partings have to be taken out either at the face or by preparation outside. If at the face, the miner's rate of loading is reduced materially, and as yet I have never seen a practical, efficient method of cleaning run-of-mine coal outside, leaving it in commercially merchantable condition. The mechanical loader takes the slate, bone, and rash just as it does the coal.

"Using conveyors doubtless cuts transportation cost, but the speed of the con-

veyor loading depends on the ability of the men to put coal on it. If they have to clean at the face, their ratio of loading is only a trifle better on the conveyor than into the mine car, always ready for them under efficient transportation management. Then, too, conveyors make so much noise that a factor of safety is reduced. The old miner knows from the sound when the top in his place is working. Further improvements in mechanical equipment, and especially cleaning devices, doubtless will come. There is a field for a low-cost, effective cleaning process.

"IF COAL can be loaded and sold as it is found in the seam; if the top is strong enough so that there is room for a loading machine to work efficiently between the timbers and the face, then it is not a difficult matter to supplant the



C. E. Bockus

human coal loader with the machine. But if the coal has partings that have to be separated, if there is a tender roof that, to insure safety, has to be supported right up to the face, the task of making such mines—and there are many of them—successful with mechanical loading, is a real problem.

"The still greater problem of the industry is to find a sale for its product at a price that will return cost plus a reasonable margin of profit on the large investment, and remember that amount must provide proper allowance for the surplus capacity that is absolutely necessary to even up the saw teeth in the curve of demand.

"As a closing paragraph, let me call attention to the effect on conservation of unreasonably low prices for coal. Conservation might well be defined practically as the recovery of all the coal that is commercially profitable to mine. In actual coal mining operations there is the widest variation in the percentage of the seam recovered. This is, of course, due in some circumstances to physical conditions of the seam, but it is an axiom that with a return for coal that equals cost plus a fair margin of profit the percentage of recovery will be greater than when the return is so low that the mine manager feels he must abandon all coal for which there would be any increase in the cost of recovery. Under existing market conditions in most fields only the cream can be mined, and it is then sold at skimmed-milk prices. The coal operator is efficient; he would be more efficient if market conditions permitted."

Ohio Exchange to Promote Fair Practices

The Ohio Coal Exchange has been created to promote a code of trade practices and "for the purpose of establishing a fuller degree of co-operation among the bituminous coal producers, members of the Ohio Coal Exchange, and to provide for fair and open competition among them." Officers of the exchange are as follows: president, F. W. Braggins, president, Lorain Coal & Dock Co., Columbus, Ohio; vice-president, C. H. Bromley, sales manager, United States Coal Co., Cleveland, Ohio; secretary and treasurer, D. F. Hurd, Cleveland, Ohio. The exchange will have quarters in Cleveland, Ohio, in the same building as the Eastern Ohio Coal Operators' Association.

Eastern Ohio Operators Elect

Consideration of the question of adopting a code of trade practices occupied those attending the annual meeting of the Eastern Ohio Coal Operators' Association, held at the Hotel Cleveland, Cleveland, Ohio, Feb. 10. Harry L. Gandy, executive secretary, National Coal Association, and R. E. Howe, secretary, Southern Appalachian Coal Operators' Association, discussed the movement, and members took up a tentative code, which will be completed at a later meeting.

Officers of the association were unanimously re-elected for the coming year, as follows: President, W. L. Robison, vice-president, Youghiogheny & Ohio Coal Co.; vice-president, R. L. Ireland, Jr., general manager, Wheeling & Lake Erie Coal Mining Co.; treasurer, Elliott Willard, assistant manager, United States Coal Co., and secretary, D. F. Hurd.

P. & R. Makes Changes

The Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., has made the following changes in its operating staff:

Frank W. Landefeld, formerly superintendent, Bast Colliery, promoted to superintendent of the new Locust Summit breaker, succeeding A. R. Harris; George Youhas, inside foreman, Pine Knot colliery, made superintendent of the Bast colliery; Norman Harrison, formerly superintendent of the Shenandoah City colliery, appointed superintendent of the West Shenandoah colliery, succeeding Peter McGonigle; Charles Blowert, inside foreman, advanced to superintendent, Shenandoah City colliery; Peter Schnee, inside foreman, Locust Gap colliery, promoted to superintendent of the Hammond colliery, succeeding Morgan Bevan; John Day, superintendent, Silver Creek colliery, transferred to the Potts colliery in the same capacity, vice John J. Herrity. Mr. Herrity has been assigned special mining work in the Locust Summit district.

I.C.C. Examiner Rules Out Mines As Transportation Property

Coal mines operated by common carriers which consume the output in the common carrier operations should not be considered transportation properties, but should be grouped with "miscellaneous physical property," according to Interstate Commerce Commission examiner Thomas D. Walton, in a proposed report dealing with a uniform system of accounts to be kept of steam railroads. Mr. Walton further recommends that the Commission find that the charges to railroad operating expense with respect to coal produced in collieries owned by railway companies, and consumed by them, should not exceed the price contemporaneously paid for coal of like kind, size, and quality purchased under contract within the same general locality. The report upsets the contention of the Norfolk & Western Ry. that coal property investments should be classed as investments in transportation property, upon which adequate rail rates must be maintained.

Coming Meetings

American Society of Mechanical Engineers. Fiftieth anniversary, April 5-9, to be celebrated in Washington, Hoboken, and New York. Beginning April 5, the first celebration will be held in the Engineering Societies Building, moving from there to Stevens Institute, at Hoboken, the last two days of the celebration being held in Washington, D. C.

Mid-West Bituminous Coal Conference; April 9-11, at Purdue University, Lafayette, Ind.

American Mining Congress; annual Convention of Practical Coal Operating Men and National Exposition of Coal Mining Machinery and Equipment, May 5-10, at Cincinnati, Ohio, under auspices of Manufacturers' Division.

International Railway Fuel Association; annual meeting, May 6-9, at Hotel Sherman, Chicago, Ill.

Mine Inspectors' Institute of America; annual meeting, May 12-14, at Deshler-Wallick Hotel, Columbus, Ohio.

National Retail Coal Merchants' Association; June 5-7, at Asbury Park, N. J.

Indiana Coal Producers' Association; annual meeting, June 6, at Terre Haute, Ind.

Second World Power Conference; June 16-25, Berlin, Germany.

Colorado and New Mexico Coal Operators' Association; annual meeting, June 18, at Boston Building, Denver, Colo.

American Society for Testing Materials; annual meeting, June 23-27, at Haddon Hall, Atlantic City, N. J.

Washington Letter

By Paul Wooton
Special Correspondent

PENNSYLVANIA in 1929 regained its position as the largest producer of bituminous coal. According to U. S. Bureau of Mines estimates for the past year, Pennsylvania had a total output of 142,400,000 tons, as against 138,015,000 tons for West Virginia. The Pennsylvania figures include an allowance for additional tonnage loaded on the Monongahela River which was reported to the Bureau late in the year and is slightly higher than the original weekly estimates would indicate.

The showing is encouraging to the Pennsylvania operators, but it is more significant to compare it with the totals for 1923, the last year before the great depression in coal began. In 1923 Pennsylvania produced 171,800,000 tons. The West Virginia production was 107,900,000 tons. Six years of the shifting fortunes of the market thus have brought a decline of 17 per cent in output in Pennsylvania and an increase of 28 per cent in West Virginia. Ten years ago West Virginia was content to point to a modest advantage over Illinois. Today it challenges the leadership of Pennsylvania and in 1927 and in 1928 actually passed it. How West Virginia has fared in comparison with other states is indicated by the following table showing the percentage the 1929 production was of the 1923 production:

Northern Fields	Per Cent	Southern Fields	Per Cent
Illinois	76	West Virginia	128
Indiana	69	East Kentucky	139
Ohio	59	Virginia	111
Michigan	66	Alabama	87
West Kentucky	128	Tennessee	95

All of the Northern states show a much smaller output than in 1923. All of the Middle Appalachian states and western Kentucky show a substantial increase. Greatest of all is the increase in eastern Kentucky, which amounts to 39 per cent. The Southern Appalachian states are slightly behind the 1923 level. This is due, to a considerable extent, to competition of fuel oil and hydro power.

In the trans-Mississippi states the competition of cheaper coals in the north and of oil and gas in the south has caused a reduction in output. Iowa and Kansas show sharp decreases. Missouri has been driven to stripping. Texas' bituminous mines are producing less, although its lignite properties are doing better. Of all the trans-Mississippi group, Oklahoma is the only one which showed a material increase in 1929 over 1923 and its tonnage is far below the levels of the war period.

The Rocky Mountain region, as a whole, has fared better than the union fields of the East and Middle West, but aside from Utah and the Rosebud field of Montana, those states show a decline.

A rosier picture is shown by the market reports and by the financial statements of some of the larger companies. From a dollars and cents point of view the industry did better in 1929 than it did during the preceding year.

Centennial of Weighing

The centennial of weighing, now being celebrated by Fairbanks, Morse & Co., marks the completion of a century since the invention of the platform scale in 1830 by Thaddeus Fairbanks, a hardware manufacturer in St. Johnsbury, Vt. As the first to make use of the familiar construction seen everywhere today, he definitely rendered obsolete the "steelyard," the only means of weighing previously known. From a small beginning, the platform scale in all its ramifications was developed until today the same principle is in use in laundry and locomotive scales.

All portable platform scales and "straight lever" railroad track scales—with one exception—have the same general arrangement and appearance as those of the St. Johnsbury inventor. Notable among the improvements since that time are the type registering beams, 1900; track scales with mechanical humps, 1911; application of the plate fulcrum principle to track scales, 1913-14, and, in late years, self-indicating, or dial machines.

Clemens Coal Co. Sold

Ira Clemens, Pittsburg, Kan., has sold the Clemens Coal Co., of which he was president for a number of years. Mr. Clemens, a director of the National Coal Association, still remains president and general manager of the Commercial Fuel Co., operating in the Kansas field.

Lehigh Coal & Navigation Sold

The Lehigh Navigation Coal Co. came into being March 1, with the purchase of all the coal-mining and marketing properties, coal accounts receivable, and real and personal property of the Lehigh Coal & Navigation Co. The new company will have its headquarters at Lansford, Pa., and will operate all the collieries of the old company in the Panther Creek region. In a general letter announcing the sale of the Lehigh Coal & Navigation Co., S. D. Warriner, president, says: "It is believed that the concentration of mining and marketing activities in a single unit will result in added service to our customers." S. D. Warriner is chairman of the board of the new company, and J. B. Warriner, president.

Pittsburgh Coal Report Shows Earnings for 1929

The Pittsburgh Coal Co., for the year ended Dec. 31, 1929, reports net earnings, before federal taxes, of $15,192, as compared to a loss of $493,871 in 1928. Net earnings for the year 1929 before depletion, depreciation, and bond and mortgage interest were $5,374,003. Gross receipts were $46,208,632. The directors, in their report to the stockholders, said that "the increase of nearly 2,000,000 tons in coal produced and sold in 1929, as compared with 1928, is a measure of the year's progress in the program of regaining lost markets. The increase was obtained in a market more highly competitive than in 1928."

The Lehigh Coal & Navigation Co., for the year ended Dec. 31, 1929, reports net income of $2,975,088 after interest, depreciation, depletion, and taxes, equivalent to $4.62 per share on 642,950 shares of $50 par stock. Earnings in 1928 were $2,525,429, or $3.93 per share.

For 1929, the preliminary report of the United States Distributing Co. shows a net profit of $1,065,028 after depreciation, depletion, interest, and federal taxes, equivalent, after dividend requirements on its own and subsidiary preferred shares, to 81c. a share on 387,434 shares of no-par common stock as compared to $868,315, or 28c. a share, on 384,434 shares in 1928.

The report of the Interlake Iron Corporation, formerly the By-Products Coke Corporation, for the year ended Dec. 31, 1929, shows net profits of $2,002,639 after depreciation, interest, and federal taxes, equivalent to $2.63 a share on 759,762 no-par shares of capital stock. This compares with earnings of $1,354,124, or $7.13 a share on 198,936 shares in 1928. The report excludes recently acquired companies, which began to operate on Jan. 2, 1930.

The Westmoreland Coal Co., for the year ended Dec. 31, 1929, reports a net profit of $144,466 after taxes, depreciation, depletion, and royalty payments, equivalent to 72c. per share on 200,000 no-par shares of stock outstanding. This compares with a net profit of $182,030 in 1928, equivalent to 91c. a share on 200,000 shares of no-par stock outstanding.

Westmoreland, Inc., organized in June, 1929, shows a net profit of $70,845 after taxes and depletion on coal lands for the year ended Dec. 31, 1929.

Elkhorn Sells Mining Plant

The mining plant of the Elkhorn Coal Corporation and the industrial town of Wheelwright, Ky., one of the largest in the Beaver coal field, has been sold to the Inland Steel Co. The consideration was not made public. The purchaser will begin operation at once and a number of improvements and extensions are reported to be contemplated.

Insurgents Call International Convention To Reorganize Mine Workers

DEVELOPMENTS in the struggle between John L. Lewis, international president, United Mine Workers, and Harry Fishwick, president, District 12, for control of the Illinois miners' union came thick and fast in the month of February. In fact, the battle front was widened to include control of the whole of the international union when a committee including Fishwick and Walter Nesbit, of Illinois; J. H. Walker, president, Illinois Federation of Labor; Alexander Howat, of the Kansas miners; John Brophy, of Pennsylvania, and Oral Daugherty, Ohio, issued, on Feb. 15, a call for a reorganization convention, to be held in Springfield, Ill., March 10. The avowed purpose of the convention is to oust Lewis and adopt a new constitution.

Lewis is charged by the committee with responsibility for the greatly decreased membership, loss of union control in certain districts, reductions in wages, and deterioration in working conditions. The convention call says, in part, that "the history of the United Mine Workers of America under the régime of John L. Lewis has been an unbroken series of defeats. The régime has thrown hundreds of thousands of our members and their families into the depths of poverty and destitution. Hand in hand with the numerical and financial disintegration of our union has gone the loss of its morale and the degradation of its institutions. Election stealing, convention packing, and slugging of delegates have reduced the old time democracy of the union to a ghastly farce."

Alexander Howat

Reorganization is made necessary, the committee explained, by the fact that the international constitution expired March 31, 1929, with no steps taken to renew its validity or adopt a new one. The present international officials, headed by Lewis, are called usurpers with no "legal right" to direct the affairs of the organization.

The action of the insurgents was met by a call for the 31st annual constitutional convention of the United Mine Workers, issued Feb. 25, during a meeting of the international executive board at Indianapolis, Ind. The date of the meeting, March 10, coincides with that called by the insurgents. Terming the rump convention as the "work and design of destructive and discredited forces, whose sole aim is to weaken and destroy the United Mine Workers of America," President Lewis, in a letter to officers and members of the international union, said that "by resolution of the international executive board, adopted, the attempt to hold an alleged international convention in Springfield, Ill., was declared to be a dual movement in violation of the laws of the United Mine Workers of America. Local unions are therefore advised to take no part in such convention or to aid or assist these destructionists in any particular."

AN OFFER to compromise, said to be for presentation at the meeting of the international executive board, was announced in Springfield, Feb. 26. According to the proposition, which was not brought to the attention of Lewis and his conferees however, the controversy between the union and the insurgents was to be aired at a neutral convention on March 10, to be presided over by William B. Wilson, former Secretary of Labor, and William Green, president, American Federation of Labor.

Further assistance for the cause of the United Mine Workers is being sought from the American Federation of Labor. Thomas Kennedy, secretary of the miners, on Feb. 28, sent a resolution to William Green, president of the Federation, calling for "quick and drastic action" in connection with the activities of J. H. Walker, of the Illinois Federation of Labor, in helping to organize the insurgent convention in Springfield. In event the Illinois organization fails to advance the cause of the United Mine Workers, the resolution recommends the "revocation of the charter of the Illinois State Federation of Labor, and its reorganization upon a proper union basis, both as to personnel, law and policy."

Reports from the Indiana coal fields indicate that the miners there will not bolt to the insurgent convention. This attitude was reinforced by the executive board of District 11, which instructed the local unions not to send delegates to any international convention, unless called for by the international union officials. In the anthracite region, the local unions are now engaged in electing delegates to the international convention at Indianapolis and seemingly are disregarding the efforts of the insurgents.

Optimism on the question of a new working agreement, to replace the present pact, which will expire Aug. 31, prevails in the anthracite field. Definite assurances of continued peace were given by international President Lewis, at the third annual dinner of the Scranton (Pa.) Central Labor Union, Feb. 20. Informal conferences between the operators and the miners have smoothed the way, he said, and "it is my hope and belief that the next 90 days will witness the execution of another anthracite agreement running for a substantial period of years from Sept. 1, 1930."

John L. Lewis

In northern West Vriginia, Van A. Bittner, director of the activities of the United Mine Workers in that area, at a mass meeting held at Morgantown, Feb. 20, again advocated legislation for the formation of a Bituminous Coal Commission; a joint board of conciliation for considering wage adjustments at stated intervals, and the elimination of strikes and lockouts during the tenure of joint wage contracts. The meeting adopted a resolution requesting the operators to meet with the miners for the purpose of negotiating a wage scale for northern West Virginia and to consider and act on other matters which would tend to stabilize the industry

Three hundred and fifty miners employed at the Graham (Ky.) mine of the W. G. Duncan Coal Co., struck on Feb. 14, though officials of the company said they had not been approached with any demands. Following a strike a few weeks ago at the mines of the Glendale Gas Coal Co., in the West Virginia Panhandle, 600 miners employed at the Powhatan mine of the Powhatan Mining Co., Bellaire, Ohio, another Paisley operation, walked out on Feb. 13, in protest against a wage cut of approximately 12 per cent. Of the two mines of the Glendale company, the Glendale plant is closed down. The Alexander mine, which resumed operations Feb. 17, was the scene of some disorder on Feb. 20, when three truckloads of men from Pittsburgh, Pa., arrived for work.

Personal Notes

JOHN KENNEDY, Welch, W. Va., has resigned as safety director for the West Virginia Department of Mines and has accepted a position with the Kanawha Coal Operators' Association, of which his father, D. C. Kennedy, is executive secretary. WALTER PERFATOR was named as Mr. Kennedy's successor.

W. V. WHITEMAN, formerly with the engineering department of the United States Coal & Coke Co., has been made general superintendent of the Kentucky operations of the company, with headquarters at Lynch, Ky.

J. A. COBB, Bonnyman, Ky., has been made general superintendent of the Kentucky operations of the Blue Diamond Coal Co., vice W. B. Goldsmith, Hazard, Ky.

GEORGE J. ANDERSON, New York City, president, Consolidation Coal Co., and J. G. Bradley, Dundon, W. Va., president, Elk River Coal & Lumber Co., have been appointed representatives of the National Coal Association at the meeting of the American Academy of Political and Social Science, to be held in Philadelphia, Pa., March 7 and 8. The general theme of the meeting will be "The Second Industrial Revolution."

SCOTT TURNER, director of the U. S. Bureau of Mines, has been elected vice-president and director of the American Institute of Mining and Metallurgical Engineers. In addition, he also was elected chairman of the Washington (D. C.) section of the organization a short time ago.

DAVID A. REED, general superintendent of the West Virginia division of the Consolidation Coal Co., has been made manager of the Elkhorn division of the company, with headquarters at Jenkins, Ky. Mr. Reed went with the Consolidation company in 1912 and served as superintendent at various northern West Virginia mines until 1920, when he was placed in charge at Monongah. Remaining at Monongah until 1923, he was made general superintendent of the West Virginia division.

EDWARD O'TOOLE, JR., has been elected president of the Central Pocahontas Coal Co., Welch, W. Va., vice L. E. Woods, and also of the American Coal Cleaning Corporation, of the same city.

L. C. PERCIVAL has been appointed general manager of sales of the Island Creek Coal Co. and the Pond Creek Coal Co., with headquarters in Cincinnati, Ohio.

ARTHUR E. DIETRICH and ROBERT E. FRAZER have been appointed New England sales manager and Eastern sales manager, respectively, for the Pittsburgh Coal Co. Mr. Dietrich, formerly gas engineer, and Mr. Frazer, manager of the New York office, will both have their headquarters in that city.

G. W. MERTENS, manager of the Pacific Coast R.R. Co., has been made assistant vice-president of the Pacific Coast Coal Co. and the Pacific Coast Cement Co. Mr. Mertens has been associated with the company for 34 years. T. M. REEDER, who has been affiliated with the organization for 28 years as assistant sales manager, has been promoted to sales manager.

New Plant Construction

New contracts for topworks and construction under way or completed at various coal operations reported in the month of February are as follows:

Benedict Coal Corporation, St. Charles, Va.; contract closed with the Morrow Mfg. Co. for all-steel tipple equipped with shaker screens, mixing and reassembling equipment, rescreen conveyor, picking tables, and loading booms, to prepare a maximum of nine sizes of coal from two seams; capacity, 400 tons per hour.

Blue Diamond Coal Co., Bonny Blue, Va.; contract closed with the Fairmont Mining Machinery Co. for four-track steel tipple equipped with shaker screens, mixing conveyors, rescreening conveyor, picking tables, and loading booms; capacity, 300 tons per hour.

Bradshaw Coal Co., Dan, W. Va.; contract closed with the American Coal Cleaning Corporation for air table for cleaning ¼x0-in. slack; capacity, 40 tons per hour.

Cannelton Coal & Coke Co., Cannelton, W. Va.; contract closed with the Kanawha Mfg. Co. for three-track tipple equipped with shaker screens, picking table, and loading boom; capacity, 350 tons per hour.

Detroit Mining Co., Gordon, W. Va.; contract closed with the American Coal Cleaning Corporation for air table to treat ¼x0-in. coal; capacity, 25-30 tons per hour.

Ford Collieries Co., Curtisville, Pa.; contract closed with Roberts & Schaefer for four-track all-steel Marcus tipple equipped with shaker screens and loading booms for preparing lump, egg, nut, and slack; capacity, 400 tons per hour; to be completed May 1.

MacAlpin Coal Co., McAlpin, W. Va.; contract closed with the American Coal Cleaning Corporation for air table to treat ¼x0-in. coal; capacity, 50 tons per hour.

Princeton Mining Co., Princeton, Ind.; contract closed with Roberts & Schaefer for five-track, all-steel Marcus tipple equipped with shaker screens and loading booms, Bradford breakers, and Menzies hydroseparators for washing slack coal; capacity, 600 tons per hour of lump, egg, nut, pea, and slack coal; to be completed Sept. 1.

Winding Gulf Collieries Co., Winding Gulf, W. Va.; contract closed with Roberts & Schaefer Co. for Menzies hydroseparators, capacity 50 tons per hour each, for installation at No. 1, No. 2, and No. 3 mines.

King Coal's Calendar for February

Feb. 6—Explosion of gas in the Standard mine of the Standard Coal Co., Standardville, Utah, causes the death of 23 men, three of whom were members of a rescue party which was caught by a cave-in.

Feb. 7—Three men killed and three others burned in an explosion of gas in the Lincoln mine of the Philadelphia & Reading Coal & Iron Co., near Pottsville, Pa.

Feb. 13—Secretary of Labor Davis, in a radio address, advocates federal control of the bituminous coal industry. "We could take this industry," he said, "and show what could be done to stabilize employment and make the business profitable. If there are laws that stand in the way, I am sure that Congress would amend them."

Feb. 15—Charging that John L. Lewis, president, is responsible for the greatly diminished membership and loss of power of the United Mine Workers, a committee, including J. H. Walker, president, Illinois Federation of Labor; Alexander Howat, Kansas; Harry Fishwick, president, District 12, United Mine Workers; John Brophy, Pennsylvania, and Walter Nesbit, Illinois, issues a call for an "international convention," to be held in Springfield, Ill., March 10. The committee explained that reorganization of the United Mine Workers was made necessary by the fact that the international constitution expired March 31, 1929, and that no steps had been taken to renew its validity or adopt a new one.

Feb. 21—The State Industrial Commission of Utah issues an order that only mining equipment approved by the U. S. Bureau of Mines may be used in Utah mines after Jan. 1, 1932.

Feb. 24—Three miners killed and seven injured in an explosion and subsequent fire at the Wath colliery, Wath, Yorkshire, England.

Feb. 25—International executive board of the United Mine Workers, at a meeting in Indianapolis, Ind., issues a call for the 31st annual constitutional convention, to be held in Indianapolis, March 10. President Lewis took note of the action of the Illinois miners in calling a "rump" convention at Springfield, Ill., March 10 and, terming it a violation of the laws of the United Mine Workers, said, in a letter addressed to the officers and members, that "Local unions are therefore advised to take no part in the convention or to aid or assist these destructionists in any particular."

Feb. 25—Gas explosion in the Lytle mine of the Lytle Coal Co., near Minersville, Pa., causes the death of four men. Three others are injured and seven are overcome by afterdamp.

Feb. 26—Sales departments of the Continental Coal Co., Fairmont, W. Va., and the Henderson Coal Co., Chartiers Creek Coal Co., Duquesne Coal & Coke Co., and Sterling Mining Co., all of Pittsburgh, Pa., consolidated to eliminate the usual stumbling block to a merger—inability to agree on a valuation of the properties.

Feb. 26—Illinois miners offer to compromise with the United Mine Workers and enter an international convention in which all factions would be represented. In the meantime, "preparation for the reorganization convention, to convene in Springfield, Ill., will proceed," an official statement said.

Feb. 26—Five men killed and twenty others badly burned in an explosion in the Lyme pit, near Haydock, Lancashire, England.

Feb. 27—The British Labor Government wins its second victory on the Coal Mines Bill when the House of Commons passes the bill through the committee stage by a vote of 280 for and 271 against. This action is said practically to assure the passage of the bill with the marketing schemes, which were strenuously objected to by the Liberals, left in.

Feb. 28—United Mine Workers, through John L. Lewis, president, asks the American Federation of Labor to revoke the charter of the Illinois Federation of Labor unless it joins the mine workers in fighting the insurgent Illinois union. The United Mine Workers assert that J. H. Walker, president, Illinois Federation, is helping to organize a "rump" miners' convention, to be held at Springfield, Ill., March 10.

Committee Authorized to Extend Trade Practice Movement

Avoidance of possible pitfalls in trade practice work by a discussion of common problems is the object of a joint committee authorized by the Market Research Institute of the National Coal Association at a meeting held in New York City, Feb. 26. The committee will be composed of one member from each district now having a trade practice code and, in addition to the objects already mentioned, will carry on a campaign within those districts to put the movement on the highest possible plane and, further, make an effort to interest other districts in such a program.

The possibility of a joint contact committee to meet with the National Association of Purchasing Agents, Inc., to develop a statement of unfair practices in the sale and purchase of coal also received attention. As a result of the discussion, the Institute directed that the purchasing agents' association be invited to meet a committee of the Institute for a consideration of the question.

McGraw-Hill Men Die

Charles Tripler Hutchinson, president, McGraw-Hill Co. of California, San Francisco, died at his home in Oakland, Calif., Feb. 12, at the age of 54. Mr. Hutchinson, who was born in San Francisco, began his business career with the Union Iron Works, of that city, in 1894, working up to the position of manager of the mining machinery department. In 1907, he resigned to accept a similar position with the Joshua Hendy Iron Works, San Francisco, from which he resigned in 1912 to become editor of *Western Engineering* and, in 1915, vice-president and general manager of the Dewey Publishing Co., of San Francisco. Joining the McGraw-Hill Co. of California as vice-president and general manager, as well as editor of the *Journal of Electricity* (now *Electrical West*), in 1922, Mr. Hutchinson was elected president of the company in 1926, which position he held until his death.

Joseph H. Bragdon, vice-president and general manager of the Bragdon, Lord & Nagle Co. division of the McGraw-Hill Publishing Co., Inc., and publishing director of *Textile World*, died suddenly of pneumonia at his home in New Rochelle, N. Y., Feb. 19. Mr. Bragdon, who was born in Melrose, Mass., June 9, 1887, joined the staff of *Textile Manufacturers' Journal*, which was published by his father, in 1911. In 1915, he was active in the merger which joined *Textile Manufacturers' Journal* and *Textile World Record* into one publication, *Textile World*. Mr. Bragdon was a member of the executive committee and of the board of directors of the McGraw-Hill Publishing Co., Inc. He also was past president of the New York Business Publishers' Association and the Associated Business Papers, the latter the highest honor in the business publishing profession. At the time of his death he was a member of the Advertising Federation of America.

Earnings and Employment Increase in December

Employment in coal mining—anthracite and bituminous combined—showed an increase in December of 1.3 per cent over November, and payroll totals were higher by 15.6 per cent, according to the monthly *Labor Review* of the U. S. Department of Labor. The 1,378 mines covered in December had 329,590 employees, whose combined earnings in one week were $10,330,850.

In anthracite mining in December there was an increase of 2.9 per cent in the employment and a rise of 36.5 per cent in the payroll totals. The increase in earnings in December over November was due largely to the steadier operating time during the month, as well as to a 25 per cent decrease in employees' earnings in November, resulting from the observance of church and legal holidays in the first half.

Employment in bituminous coal mining increased 0.5 per cent in December, as compared to November, while the payroll totals increased 2.1 per cent, as shown by the reports from 1,216 mines, in which there were in December 208,190 employees whose combined earnings in one week were $5,545,294. Increases in employment were shown in six geographic divisions and slight decreases in the Middle Atlantic and East South Central divisions. Substantial increases in earnings also were noted in six of the divisions, the West North Central leading, with a gain of 20.2 per cent, followed by the East North Central, with an increase of 14.9 per cent, and the Pacific division, with 12.6 per cent.

Obituary

GEORGE OWENS CLINCH, vice-president, Crerar Clinch Coal Co., died at his home in Chicago, Feb. 8, after an illness of three weeks.

FRANK H. HEMELWRIGHT, 60, a director of the Glen Alden Coal Co., died at his home in Scranton, Pa., Feb. 7, of a heart attack. Mr. Hemelwright was a prominent figure in the anthracite industry for more than 30 years prior to his death. Starting as a breaker boy, he became an authority on anthracite mining, and was at one time president of the Temple Coal Co., Scranton, Pa.

H. E. BISSELL, 39, treasurer of the Black Diamond Coal Mining Co., died at his home in Birmingham, Ala., Feb. 15, after a short illness. Mr. Bissell was closely identified also with motor-coach transportation.

ROY A. HATFIELD, pioneer coal operator in the central Pennsylvania field died of a heart attack, Feb. 24, at his home in Altoona, Pa.

HERBERT J. HERROLD, former president of the Canada Coal Co., died at Toronto, Feb. 11, at the age of 50. Mr. Herrold became traffic manager of the Algoma Central & Hudson Bay R.R. twenty years ago, and ten years ago resigned to become president of the Canada company, which position he held until ill health forced him to relinquish it a short time ago.

ABNER WALLACE OSBORNE, vice-president and co-founder of the Youghiogheny & Ohio Coal Co., died at Cleveland, Ohio, March 5. Mr. Osborne, who was 78 years old, entered the coal business as a young man, and after successful operations in western Pennsylvania and eastern Ohio, went to Cleveland in 1900, helping to found the Youghiogheny & Ohio in 1902.

Employment and Payrolls in Identical Bituminous Coal Mines In November and December, 1929

	Mines	Number on Payroll — Nov., 1929	Dec., 1929	Per Cent Change	Amount of Payroll — Nov., 1929	Dec., 1929	Per Cent Change
Middle Atlantic	389	64,424	63,974	—0.7	$1,713,290	$1,659,113	—3.2
East North Central	171	29,129	29,859	+2.5	765,856	880,117	+14.9
West North Central	49	5,026	5,256	+4.6	117,727	141,449	+20.2
South Atlantic	289	49,437	49,693	+0.5	1,306,420	1,278,352	—2.1
East South Central	186	40,104	39,946	—0.4	852,218	886,574	+4.0
West South Central	26	2,629	2,653	+0.9	70,795	74,515	+5.3
Mountain	96	15,047	15,390	+2.3	557,437	570,767	+2.4
Pacific	10	1,414	1,428	+1.0	48,307	54,407	+12.6
All divisions	1,216	207,210	208,199	+0.5	$5,432,050	$5,545,294	+2.1

Per Cent Change in Each Line of Employment, November and December, 1929

	Establishments	Employment — Nov., 1929	Dec., 1929	Per Cent Change	Payroll in One Week — Nov., 1929	Dec., 1929	Per Cent Change
Manufacturing	12,247	3,385,404	3,265,373	—3.1[1]	$90,071,141	$86,716,833	—3.3[1]
Coal Mining	1,378	325,206	329,590	+1.3	8,938,925	10,330,850	+15.6
Anthracite	162	117,996	121,301	+2.9	3,506,875	4,785,556	+36.5
Bituminous	1,216	207,210	208,199	+0.5	5,432,050	5,545,294	+2.1
Metalliferous mining	346	62,294	59,554	—4.4	1,859,651	1,814,377	—2.4
Quarrying and non-metallic mining	655	36,815	33,660	—8.6	940,597	836,195	—11.1
Public utilities	9,463	720,184	713,110	—1.0	21,105,998	21,514,456	+1.9
Trade	8,102	311,528	357,225	+14.7	7,712,387	8,622,630	+11.8
Wholesale	1,778	60,521	60,275	—0.4	1,830,509	1,882,171	+2.8
Retail	6,324	251,007	296,950	+18.3	5,881,878	6,740,459	+14.6
Hotels	1,784	149,452	146,041	—2.3	2,524,248[2]	2,500,296[2]	—0.9
Canning and preserving	457	36,490	23,537	—35.5	636,360	440,271	—30.8
Total	34,432	5,027,373	4,928,090	—2.0	$133,789,307	$132,775,908	—0.8

[1]Weighted per cent of change for the combined 54 manufacturing industries; the remaining per cents of change, including total, are unweighted. [2]Cash payments only.

Coal-Mine Fatalities Greater in January, 1930, Than in the Same Month Last Year

ACCIDENTS at coal mines in the United States during the month of January, 1930, caused the loss of 212 lives, according to information received from state mine inspectors by the U. S. Bureau of Mines. Of this number, 164 deaths occurred in bituminous mines in various states and the remaining 48 occurred in the anthracite mines of Pennsylvania. The production of bituminous coal during the month was 49,778,000 tons and that of anthracite amounted to 7,038,000 tons. Based on these figures the fatality rate for bituminous mines was 3.29 per million tons of coal produced, the anthracite rate was 6.82, while the industry as a whole showed a rate of 3.73. This record is less favorable than that for January a year ago, when there were fewer deaths and a greater production.

The fatality rate for bituminous coal in January, 1929, was 2.78, based on 143 deaths and 51,456,000 tons; that for anthracite was 5.72, with 42 deaths and 7,337,000 tons; and the rate for both bituminous and anthracite combined was 3.15, based on 185 deaths and 58,793,000 tons. January, 1930, showed an improvement over the preceding month of December, 1929, for the coal industry as a whole and especially for bituminous mines, but the rate for anthracite mines was somewhat higher.

Two major disasters—that is, disasters in which five or more lives were lost—occurred in the month of January, 1930. These were both explosions; one at Straven, Ala., on Jan. 13, caused the death of 7 men, and one on Jan. 19, at Lillybrook, W. Va., resulted in the loss of 8 lives. In January a year ago one major disaster at Kingston, W. Va., took a toll of 14 lives. Based exclusively on these disasters, the death rate per million tons of coal mined in January, 1930, was 0.26, as compared with 0.24 in January, 1929.

Comparing the accident record for January, 1930, with that for the same month of 1929, a reduction is noted in the death rates for haulage and local explosions, while increased rates are shown for falls of roof and coal and electricity and slight increases for explosives, major explosions, and "miscellaneous" accidents. The comparative rates for all classes of accidents are as follows:

	Year 1928	Year 1929	January 1929	January 1930
All causes	3.777	3.623	3.147	3.731
Falls of roof and coal	1.854	1.957	1.497	2.007
Haulage	0.626	0.683	0.698	0.686
Gas or dust explosions:				
Local explosions	0.087	0.083	0.136	0.088
Major explosions	0.566	0.241	0.238	0.264
Explosives	0.128	0.146	0.170	0.176
Electricity	0.153	0.134	0.119	0.123
Miscellaneous	0.363	0.379	0.289	0.387

Bureau of Mines Issues Permissible Plates

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines during the month of February, as follows:

(1) Diamond Machine Co., rock-dusting machine; 12-hp. motor, 95 volts, d.c.; Approval 183; Feb. 4.

(2) Colonial Supply Co., Siemens-Schuckert drill; ½-hp. motor, 250 volts, d.c.; Approval 184; Feb. 7.

(3) Jeffrey Mfg. Co.; Type 24-B longwall mining machine; 220-440 volts, a.c.; Approvals 185 and 185-A; Feb. 24.

Utah Explosion Kills 23

Upon completion of the rescue work carried on after the explosion in the Standard mine of the Standard Coal Co., Standardville, Utah, Feb. 6 (reported in last month's issue of *Coal Age*), 23 men were found to have lost their lives. Twenty deaths were directly attributable to the blast and the afterdamp which followed it, and three men of a rescue party were killed in a cave-in on Feb. 7. Property damage was said to have been slight.

Coal Mine Fatalities During January, 1930, by Causes and States

(Compiled by Bureau of Mines and published by *Coal Age*)

State	Underground												Shaft					Surface							Total by States	
	Falls of roof (coal, rock, etc.)	Falls of face or pillar coal	Mine cars and locomotives	Explosions of gas or coal dust	Explosives	Suffocation from mine gases	Electricity	Animals	Mining Machines	Mine fires (burned, suffocated, etc.)	Other causes	Total	Falling down shafts or slopes	Objects falling down shafts or slopes	Cage, skip or bucket	Other causes	Total	Mine cars and mine locomotives	Electricity	Machinery	Boiler explosions or bursting steam pipe	Railway cars and locomotives	Other causes	Total	1930	1929
Alabama	4			7			2		1			14													14	6
Alaska																									0	0
Arkansas																									0	2
Colorado	3	1	3									7													7	5
Illinois	6		2				2					10													10	10
Indiana	1		1		1							3													3	3
Iowa	2		1									3													3	0
Kansas				2			1					3													3	2
Kentucky	11		3				2				4	20													20	17
Maryland																									0	0
Michigan																									0	0
Missouri	1											1													1	2
Montana																									0	0
New Mexico	1											1													1	0
North Dakota																									0	1
Ohio	5											5										1		1	6	8
Oklahoma			1									1		1			1								2	0
Pennsylvania (bituminous)	19	2	4		2		1	2			1	31						1						1	32	29
South Dakota																									0	0
Tennessee	1											1													1	0
Texas																									0	1
Utah	1		1	2	2							6													6	1
Virginia	4		2									6											1	1	7	3
Washington			1									1													1	2
West Virginia	14	8	15	8								45													45	50
Wyoming	2											2													2	1
Total (bituminous)	75	11	34	19	5		7	1	3		5	160		1			1	1				1	1	3	164	143
Pennsylvania (anthracite)	25	3	5	1	5						2	41						2		2		2	1	7	48	42
Total, January, 1930	100	14	39	20	10		7	1	3		7	201		1			1	3		2		3	2	10	212	
Total, January, 1929	71	17	41	22	10	1	7		7		1	177						3		1		1	3	8		185

OPERATING IDEAS

From PRODUCTION, ELECTRICAL And MECHANICAL MEN

Clamping Blocks Facilitate Turning of Tires Without Annealing

IT IS a common opinion that turning tires of electric locomotives without annealing is impractical, and some go so far as to say it is impossible. Several companies do it, however, and among these is the Island Creek Coal Co., Holden, W. Va. In the central shop this method of reconditioning locomotive trucks has been practiced for over two years and still continues in favor.

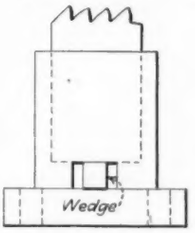
Hard spots, attributed to the action of electric current, and chattering, are the difficulties usually encountered. Because the first cut must be deep enough to get below the hard skin of the tire tread, chattering is difficult to prevent even with a heavy lathe. At Holden chattering is eliminated by the use of an extension center and four adjustable blocks, all of which fasten to the lathe faceplate.

After the truck is swung between the lathe centers, two long bolts with the heads anchored in the faceplate grooves are tightened slightly to counteract the force of the four blocks, which otherwise would put a heavy thrust on the tailstock lathe center. The bolts extend between spokes of the wheel center and through short lengths of heavy iron, which act as washers on the inside of the spokes. Next, a wedge is driven into the hole at the base of each block, to force the sliding part out against the wheel core. Thus the wheel core is held rigidly against the faceplate blocks by the two bolts. Teeth on the sliding parts of the four blocks supply the faceplate engagement for the drive.

A sketch indicates the construction of a block. The body was made by electric welding five pieces cut from heavy steel plate. The slide with toothed end is made of tool steel.

Usually four or five hard spots about the size of a dime are encountered on each tire. Climbing of the lathe tool brings these to light. As each one is found it is ground with an 8-in. electric grinder suspended conveniently above the lathe by an adjustable spring hitching. The hard spot is ground slightly below the estimated depth of the last cut. The position of the truck is reversed in the lathe for turning the second wheel; in other words, turning is done only at the faceplate end.

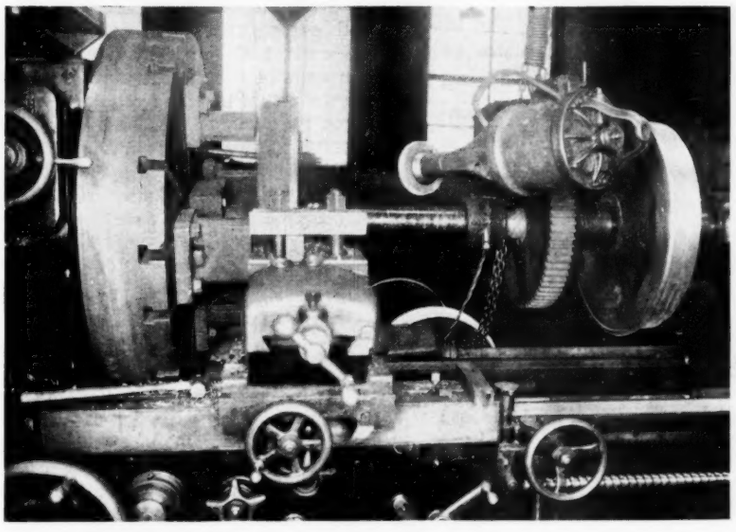
The lathe tool is 1½x2 in. and is of "Rex AAA" steel. A speed of 2.7 to 3.5 r.p.m. is used for turning 30-in. tires. Because of the necessity of taking a rather deep cut to get under the hard skin, tires are subjected to but one turning during their life.



Face Block Construction

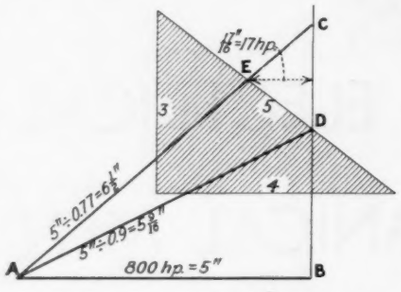
Turning without annealing is favored because of saving the labor of removing and reassembling tires on the wheel cores. There also is a satisfaction and advantage in eliminating the "dirt and fuss" incident to heating. Annealing without removing the tire from the core proved impractical because of ultimately loosening the wheel core fit on the axle.

Lathe and Grinder Setup for Turning the Tire Without Annealing



Power-Factor Problems Solved Graphically

Assuming an a.c. load of 800 hp. at a power-factor 0.77, how much of that load would have to be replaced by synchronous motors rated 0.8 leading power-factor in order to raise the load power-factor to 0.9? By a graphic method this becomes a simple problem in arithmetic instead of one involving degrees of angles and trigonometry. All that is needed is a ruler, pencil, paper, and a triangle cut from cardboard with



Determines Size of Synchronous Motor

sides 3 in., 4 in. and 5 in. or in those proportions.

Selecting a convenient scale—for instance, ⅛ in. equal to 10 hp.—draw the horizontal line *AB* 5 in. long to represent 800 hp., and draw a vertical line of convenient length at *B*. Divide 5 in. by 0.77, which equals 6½ in. On the vertical line find a point *C*, which is 6½ in. from *A*, and connect with the line *AC*. Divide 5 in. by 0.9, which equals 5 5/8 in. Again on the vertical line find a point *D*, 5 5/8 in. from *A* and connect with line *AD*. Put the long side of the cardboard triangle on point *D* so that the base of the triangle is parallel to *AB*. This determines a point *E*. Draw the horizontal line *EF*. Measure the line *EF*, equal 17/16 in. Converting this according to the scale of ⅛ in. equal to 10 hp., results in the answer of 170 hp.

This method is explained in a bulletin, No. GET-191, "Industrial Power-Factor Problems Solved by Scale," published by the General Electric Co. With the bulletin, which has but four pages, is an aluminum "3-4-5," 0.8 power-factor triangle. The publication illustrates the solution of nine other power-factor problems.

Maintenance Painting At Old Ben Plants

Much of the effort and expense incurred in the maintenance of equipment and structures at some mine plants results from a lack of vigilance in upkeeping. If, for example, damage to materials by rusting is not prevented, failure at one point may bring to an untimely end the usefulness of an entire piece.

The Old Ben Coal Corporation, operating in Illinois and West Virginia, fights the inroads of rust on such structures as transmission towers and transformer platforms fabricated of steel pipe and structural pieces by protecting the surfaces with a covering of paints of high quality. Its standard practice is first to thoroughly remove all traces of rust and then to apply two coats of red lead with a finishing coat of aluminum paint. According to the officials of this organization, when these structures are painted in this manner, they will require no further attention for many years.

Power Cost Reduced By Dispatching

A reduction of approximately 100 kva. in the billing demand and 7 per cent in the power bill has been accomplished by re-arranging the main haulage schedule at the Sands mine of the Continental Coal Co., Fairmont, W. Va. At Sands mine, two Goodman 15-ton locomotives, hauling 2½-ton cars, bring the coal from different sections of the mine to the tipple. Formerly these locomotives ran according to no definite schedule and quite frequently both were helping to boost the demand.

After some study it was found that by the installation of a system of signal lights these two locomotives could be operated with the loaded trips separately. Consequently, the demand was lowered by practically the demand of one machine, with the power savings noted above. This method, by which the dispatcher governs the movement of the trips, also has been extended to the Brock and Parker Run mines of the company, with satisfactory savings in each instance.

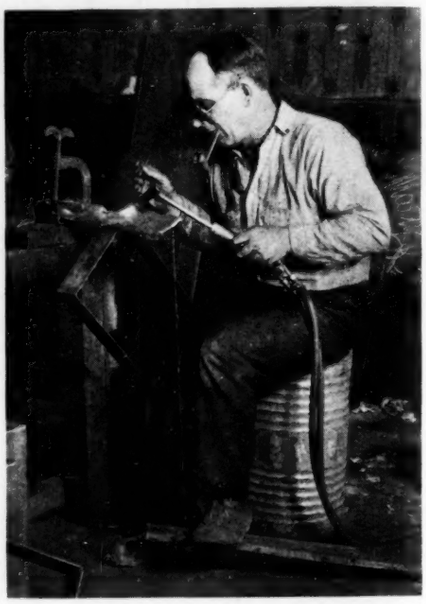
Changing Practices Breed New Ideas

Mining practices are changing constantly and with these changes is a continual alteration in the design and application of electrical and mechanical equipment. Not always are improvements first contained in manufactured equipment. Generally they originate at the plant and are developed by alteration of used equipment or by the building of a new unit on the ground. These changes constitute operating ideas, useful at once to manufacturers and to mine officials. Most men are proud of what they have conceived and developed. Are you? Let the readers of these pages appraise your ideas. Send them in, appropriately illustrated, by sketch or by photograph. If published, they will be paid for—$5 or more for each.

Welding Is Speeded Up By Simple Jig

The widespread use of jigs in welding in the automotive industry and in sheet-metal shops has speeded up production so noticeably that others are beginning to investigate the possibilities of these devices. Repetitive jobs should be studied with this in view.

An example of the application of a jig to a simple job in a small shop is illustrated in the accompanying photograph. Details were furnished by the Linde Air Products Co. The job at hand has

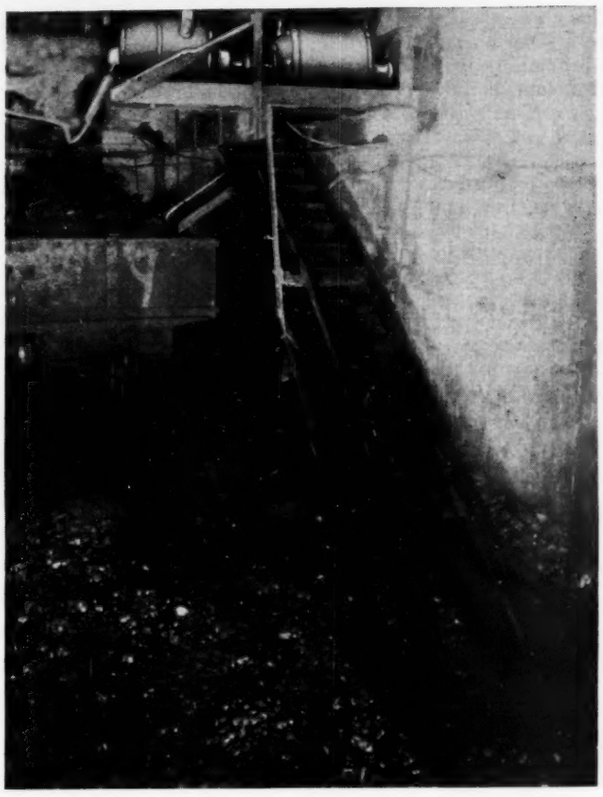


No Clamping or Holding Necessary

to do with the welding of a joint in a rectangular form constructed from a strip of sheet steel. This rectangular form is used to band together the wooden flask holding the mold into which molten metal is poured in the making of a casting in a foundry. The jig consists merely of two short pieces of angle iron which are nested, one within the other, held projecting from the end of a bench by a clamp. The two ends of the rectangular band which are to be joined are inserted between these two angles and held in place by the pull of a wire from a foot treadle. A hole in the upper angle exposes the joint to the welding flame. A jig similar to this one might be used in many jobs.

Water Flushes Spillage Into Sump Conveyor

As the production of Federal No. 1 mine, New England Fuel & Transportation Co., Grant Town, W. Va., was increased, cleaning coal spillage out of the sump at the bottom of the hoisting



Sump Cleaning Is Now a Continuous Process

shaft became a serious problem. The depth was insufficient to install a hopper which would deflect the coal to a conveyor. A way around the difficulty, however, was found by installing a sump conveyor and using a stream of water to wash the coal down deflector plates to this conveyor.

The accompanying photograph shows that portion of the conveyor which is above the level of the mine floor. It extends parallel to the long dimension of the shaft, and discharges directly over a track where empty cars can be spotted. Above the discharge end of the conveyor is the driving unit consisting of a 5-hp. motor and speed reducer.

As originally installed, the top run of the conveyor, which is of the scraper flight type, 12 in. wide, carried the coal. This proved unsatisfactory because it carried back too much slack. So a change was made allowing the bottom run to do the conveying. With this arrangement any slack dropping from the return strand lands on the outgoing coal.

At a production of 6,100 tons per day the installation reduces the hoisting period by two hours. Formerly it was necessary to stop the hoisting several times during the day to partially clear the sump, and three men were employed at night in the final cleaning. Now one man working on the day shift handles the work, which is conducted without interrupting the hoisting. He spends most of his time spotting and trimming the cars.

The cost of the installation was approximately $500 plus the value of some materials taken from stock. Savings in the first month probably equalled the total cost.

Substation Motor Used on Stand-by Power Unit

At the Federal No. 1 mine, New England Fuel & Transportation Co., Grant Town, W. Va., a need arose for a gasoline-electric stand-by fan drive, and, as the capacity of the proposed generator closely coincided with the 300-hp. synchronous motors driving the substation generators, it was decided to purchase a duplicate of these motors and to use it as a generator direct-connected to the engine.

This installation illustrates an unusual step in the standardization of equipment. When purchase is made of a new piece of equipment similar to units already in use at a property, as in this case, the necessity for carrying a new set of spare parts is removed. Moreover, in case of an emergency, it affords the opportunity of temporarily shifting a unit from one duty to another, keeping the important equipment going and shutting down only that which is least important.

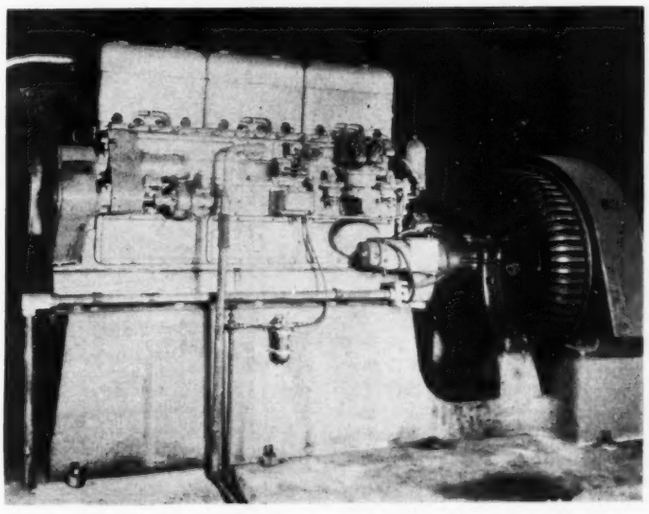
In this particular installation the stand-by was intended principally for emergency operation of the main fan. The engine is a 6-cylinder Sterling with quadruple ignition, rated 420 hp. at 1,200 r.p.m. The motor used as a generator has a direct-connected exciter.

Synchronous Equipment Cuts Power Cost

Replacing a fan motor with synchronous equipment and reducing the number of metering points from two to one at the Laura Lee mine of the Hutchinson Coal Co., Hepzibah, W. Va., resulted in a saving of about $90 on the monthly power bill. With the original arrangement, the current to the rotary converter equipment in the substation was metered at one point. Power for the 50-hp., slip-ring induction motor for driving the tipple machinery and for the 75-hp. induction motor operating the fan were metered at another point.

In rearranging the equipment layout, all transformers supplying power to the fan and tipple motors were moved to the substation. This enabled the company to meter all its requirements at one point, dovetailing what had formerly been two

This Generator Is Interchangeable With Substation Motors



demands, and consequently reducing the power bill. Still further reduction in the monthly charge for power was obtained by replacing the former fan equipment with a 50-hp. synchronous motor having an 80 per cent leading power factor. Its operation neutralizes the lag caused by the induction motor on the tipple, with a corresponding reduction in the demand charge.

Psychological Control Of Inventory

Unless considerable care is exercised in ordering spare parts for mechanical and electrical equipment, the inventory of materials will soon reach a burdensome figure. Herbert B. Husband, general manager of fuel-mine operations,

An Asset or a Liability —Which?

Chesapeake & Ohio Ry., Dorothy, W. Va., finds that painting the cost and purchase date on expensive repair parts aids in controlling the inventory.

Officials who have access to the warehouse thus constantly are faced with evidence of costly items which have been in stock for a number of years. This promotes additional caution in approving requisitions for parts which are not in immediate demand and for those which are purchased only for insurance and may never be needed.

Steam-Plant Condensate Makes Better Ice

When the Colcord Coal Co., of Montcoal (Raleigh County), W. Va., used raw well water for its refrigerating plant in the basement of the commissary, the ice came out white instead of with that transparency so desirable in domestic retailing. The trouble was corrected by investing in a small storage tank and a few hundred feet of $\frac{3}{4}$-in. pipe, which is buried in the ground to prevent freezing.

The company generates its own electric power at an 800-kw. steam plant located near the tipple. The normal discharge of distilled water coming from the steam traps of this plant is now utilized for the ice making. This water forms transparent ice and, of course, is free of bacteria.

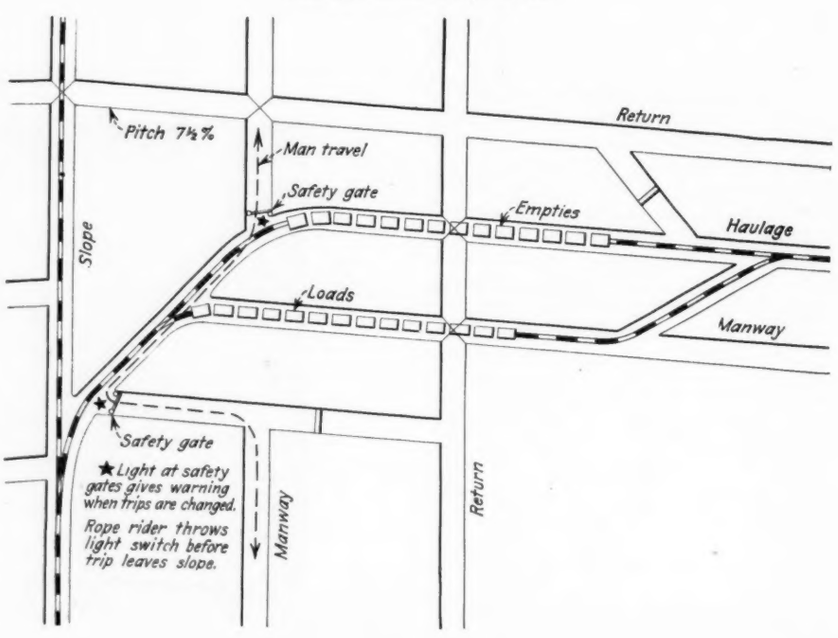
A pump is not required for forcing the water through the $\frac{3}{4}$-in. line and elevating it 20 ft. to a storage tank located back of the commissary. Steam pressure acting through the traps forces the water directly to the tank. Normal condensation from the main header and from other steam pipes in the power plant supplies just enough water for the ice making.

Crossing a Car Parting Under Heavy Cover

In mining under heavy cover, surmounting one obstacle often intensifies another. An example of this is pointed out by W. H. Weimer, mining engineer, Union Pacific Coal Co., in the operation of mines at Superior, Wyo. There, the thickness of the cover over the advanced workings has become so great that no longer is it practicable to support the roof over a double track parting.

This obstacle is overcome by establishing one parting on two entries, with a single track in each, thereby making possible the driving of the entries narrow at the parting. Thus are the roof conditions satisfied. But the problem of crossing the parting twice with the manway is then created. To make a direct crossing would require cutting up a chain pillar where all of it is needed to support heavy cover; also the crossing would introduce a double hazard in travel in that men and stock would be required to pass through two trips of cars. These obstacles and hazards have been eliminated at Superior by the adoption of a parting layout shown in the accompanying sketch.

Parting and Manway Layout



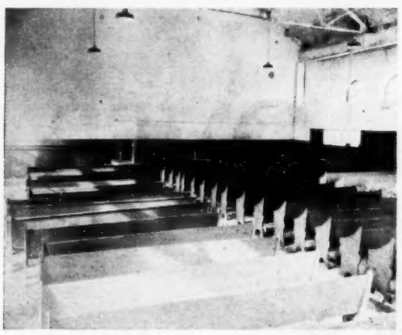
Once Generated Power; Now Generates Interest

Activities directed toward the prevention of injuries at the Keystone (W. Va.) mine of the Houston Collieries Co. brought out the need of a

Original and Present Power Houses

hall better suited to safety meetings than the school building formerly used for that purpose. An abandoned power house was reconditioned for this service at a relatively low cost.

The building, which has thick nicely laid walls of stone, had been used for a number of years as a place for storing and breaking up iron scrap. As a result of shooting this scrap the windows had been broken and the roof damaged to the extent that the building was far from an ornament. The roof and windows were replaced and a plastered partition



Meeting Room in Old Power House

erected, making a room 50 ft. wide and 65 ft. long. The walls and ceiling were painted white and steam radiators installed.

The hall equipment consists of blackboards, a speaker's stage and desk, and benches that were made locally. With 50 benches, each capable of seating 6 to 8 persons, there is considerable floor space to spare. The room interior has a spacious, cheerful appearance, and no longer bears any earmarks of formerly having been an engine room.

Overhead Swing Hoist For Mine Yard

If a small windlass is mounted on a standpipe in such manner that it can be revolved into a position parallel to a swinging pulley beam, the resulting mechanism is a hoist which can be used for that occasional lifting job in a mine

For the Occasional Lifting Job

yard. A device with these features is shown in the accompanying illustration.

The windlass itself is turned by a worm gearing and is attached to a sleeve bearing on the standpipe. Both the windlass and the pulley beam swing through 180 deg.

Screen on Pan Conveyor Aids Coal Cleaning

It is generally agreed that the first step in the cleaning of coal should be taken underground, for every pound of refuse loaded with the coal and taken outside adds to the cost of haulage, tipple operation, and rock disposal. Probably no better opportunity or facilities for cleaning coal underground have been found than those provided by shaking conveyors. The movement of coal on the pans is such that refuse may be readily spotted and removed. In this case, however, as in the cleaning of coal by picking in a tipple, the presence of slack in the coal is an interfering factor. If the fine coal can be removed before an attempt is made to clean the larger sizes, the removal of refuse will be more thorough.

Mining by shaking conveyors in a room-and-pillar layout has for several years been a practice in the Ehrenfeld mine of the Pennsylvania Coal & Coke Corporation, operating in the central field of Pennsylvania. At this plant the coal frequently is cleaned or picked at the discharge end of the shaking conveyors. In order to aid the removal of refuse from the coal, the fines are removed by a screen integral with the last conveyor pan. The screen is formed by drilling $\frac{3}{4}$-in. holes in the floor of this pan. A false bottom carries the fine coal to the mine car simultaneously with the travel of the bulk of the coal on the screen above it.

Electric Grinder Supported By Spiral Spring

The term "hand", as applied to an electric emery wheel grinder of the type used in heavy machine shops, implies that the unit is of such design, as to size and weight, that it can be handled by one man. It does not necessarily mean that the grinder can be conveniently manipulated and held to the work by that one man. Grinders of the type used in mine shops generally are too heavy for one-man manipulation.

At the Valier mine of the Valier Coal Co., in Illinois, a hand-type electric grinder in the machine shop is suspended from a flexible spiral spring which in turn is suspended from the tackle of a chain block. This spring is sufficiently strong to hold the grinder above the floor and yet give when moderate pressure is applied by the workman using the unit. Thus the workman is relieved of the labor of holding up the grinder and is free to expend his efforts toward guiding it. The chain block is suspended from a trolley hanger on a swinging beam.

Welding Strengthens Electric Drill Bits

Drill irons which hold fishtail bits for electric coal drills, as received at the plant in their original form, may not be strong enough to stand the gaff of drilling a particularly hard coal. This

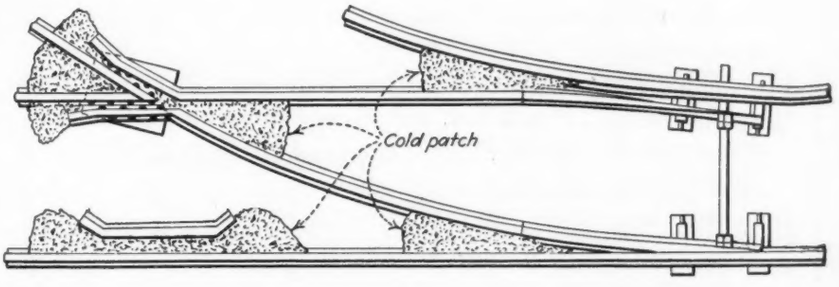
Welding Drill-Iron Shoulder

at least has been a trouble experienced at the No. 9 mine of the Peabody Coal Co., Illinois. To overcome this weakness the shoulders, at which point the break usually occurs, are reinforced by oxyacetylene welding before the drill iron is used.

Switches Safely Blocked With Tar Product

Wood as material for use in blocking switches to eliminate the possibility of employees being caught and injured by haulage machinery has been replaced by a cold-tar patching compound in the mines of the West Virginia division, Consolidation Coal Co. This compound, which consists of an asphaltic material in which is mixed limestone chips, is commonly used in repairing hard-surfaced roads. In place of wood, the cold patch compound is tamped in the switch at the danger points, as shown in the sketch. It is permanent and, being of a plastic nature, will come back to its original shape after cars are dragged through it.

Showing Switch Blocked With Cold-Tar Patching Material



THE BOSSES TALK IT OVER

Dirty Coal— No Work

"WHAT'S this idea about no work tomorrow, Chief?" asked Mac in one of his daily talks with the super. "I thought we had orders for steady work."

"We did, but not now," replied Jim. "Take a look at some of these letters from customers, and you'll know the trouble. Our slack is sold on a guaranteed ash content. Lately the ash has been running 'way above our maximum figure and the customers know it. Hence these letters of complaint and even of cancellation."

"But our slack is the best coal we have," interrupted the foreman. "It comes mostly from those friable bands that analyze so low in ash. The only impurities in the whole bed are those laminations of bone and sluff, and the track-mounted cutting machines take care of them."

"I know, Mac; but just the same the dirt is getting in, some way. Maybe the kerf isn't always cleaned out; maybe the bottom isn't scraped and swept before shooting; maybe some of the men are deliberately loading some bug-dust or refuse with the coal."

"Well, boss, we can't stay in the rooms to see that the loaders handle their job properly. I don't know what to do."

"That's your job, Mac. You'll have to work up some scheme. If you fail, the job will be up to me; if I fail, the old man will take a hand; and if he fails, the next hand will be the receiver's."

WHAT CAN BE DONE?

1. *Do you keep track of machine cuttings?*
2. *Would it be best to have company men handle the cuttings?*
3. *Can a control system be built around face sampling?*
4. *Would random court-yard inspection of individual mine cars help any?*
5. *How would you handle this situation?*

All superintendents, foremen, electrical and mechanical men are urged to discuss the questions on page 190. Acceptable letters will be paid for ▶▶▶▶

WHAT IS THE BEST SYSTEM for training substitute motormen and trip riders to avoid the evils of uneven production performance of locomotives due to absenteeism in the ranks of haulage men? This was the problem forced on Mac and Jim by the Old Man in February. How readers of *Coal Age* would solve this problem is told in the letters following.

Efficient Organization Has Adequate Reserve Man Power

CUSTOM and environment, and to some degree the hazardous character of his occupation, have formed in the miner the habit of "laying off" periodically. Pay day and the days immediately following it usually are chosen for this respite from work, which sometimes results in a serious curtailment of production. Fifteen years ago the operators looked upon this sort of holiday, with the best possible grace, as a necessary evil incident to the operation of a mine. In those early days mine labor was at a premium, strict discipline was unenforcible, and all attempts to establish regular working proved abortive. Foremen who could secure and hold labor were in great demand, and got the call on all good jobs. Such were the conditions prior to and immediately following the World War, aggravated, no doubt, by peak prices.

In recent years, however, labor has taken a complete about-face. With increased stabilization of prices and production, labor now seeks employment where formerly its services were solicited, and yields more and more to proper discipline. Mac and Jim must wake up to the fact that irregularity of production in haulage is directly chargeable to slack discipline in a weak organization.

Workmen should be required to obtain leave of absence before laying off. This regulation will enable the boss to fill any vacancy with a competent man and avert a disruption of output. Men who have no sense of responsibility or appreciation of their jobs have no place in an efficient mine organization.

But even with the best management, a mine is liable to be faced with a man shortage at times, so provision must be made to replace absentees promptly with experienced men. To meet such contingencies, a mine must carry a few trained motormen and brakemen on its floating or extra crew. In case no extra men are carried on the payroll, the management must fill temporary vacancies in important jobs with combination men who are experienced in more than one class of mine work, and who work ordinarily as slatemen, wiremen, or trackmen. The employment of experienced extras renders the mine foreman independent in case of an emergency.

To further expedite smooth and continuous operation, every brakeman should be trained as a motorman on his own section. Then, in the event that a motorman fails to appear for work, his brakeman can carry on in his place and an extra man utilized as a brakeman. This arrangement will be found to offer the simplest and best solution to the problem, for the brakeman serving as a motorman is thoroughly familiar with the section and should function with little loss of tonnage.

In the reserve man-power of a mine organization lies its strength. To create and maintain reserve strength, men must be trained and kept trained. The training of brakemen should begin on sections where production is limited to only a few places, where the green man may be given instruction in safety without curtailing production. Insist on and encourage the switching of jobs between motormen and brakemen at times when speed is not essential. It is a poor policy for a boss to select men for such jobs who have not demonstrated their ability to perform them.

H. A. McCOY. *Stanaford, W. Va.*

What Readers Say

A brakeman should be trained as an understudy to the motorman working with him.

Men competent to fill in as brakemen, who ordinarily work as daymen, should be carried on every payroll.

If a brakeman shows no ability as a motorman, he should be taken off the haulage system, no matter how well he handles his own job.

Should a motorman desire a change to contract work, his request should be granted, provided he agrees to go back to his old job in an emergency.

Delinquent motormen and brakemen should be discharged regardless of their ability.

Haulage attendance is a young man's job.

Employees on the Extra List Must All Be Good Workmen

I ALWAYS keep busy at laying track, hanging wire, bonding track and even working as brakemen, a reserve of men who are skilled motormen. This practice does not raise my costs, as I can manage to spare one or more of these men from their regular jobs when the regular motormen fail to report for duty. These substitutes can manage the motor and hauling almost as well as the regulars.

At this time, when mines are not all in operation and skilled men are begging for places, one usually has a number of men who can do almost anything that comes along. I hire efficient bosses, skilled trackmen, linemen and motormen, even though I don't need them for the jobs at the moment; I give them the best thing I have open and keep them to fill vacancies in the work for which they are best fitted. These men are intelligent and do their best.

R. C. MITCHELL.
Milburn, W. Va.

Poor Track and Equipment May Slow Up Sub Motorman

NOT ALL the delays in haulage occurring when regular motormen are off duty can be attributed to the inexperience of substitute motormen. If the track and rolling stock are in bad condition, the substitute will run his trips cautiously for fear of derailments. The regular motorman, through time and experience, becomes intimately acquainted with the run and knows exactly when to speed up and when to take his time. Some regular motormen become calloused to danger and take chances. Through strokes of good fortune they may avoid accidents, and in that case they are considered good men. You will find that where track is well maintained substitutes will come nearer to filling the shoes of the regulars than when the track is in need of conditioning.

JOHN J. CHIRE.
Hazleton, Pa.

Employ Only Steady Workers For the Job of Motorman

TO AVOID DECLINES in tonnage due to the failure of haulage men to report for work, the boss driver or the section foreman should have available for substitution a few men who understand how to run the motor as well as the regular motorman. Brakemen make ideal substitute material. While it is proper to have a reserve of men to fill vacancies in haulage, absenteeism should be discouraged, for the substi-

tute, no matter how capable he may be, will not be likely to cover a particular run as well as the regular motorman.

Mac should choose only those men who want to work every day. Celebrations on pay day and on "Blue Monday" should be a thing of the past. Any motorman who takes one or both of these days off, no matter how good he is, should be discharged. It is not a good practice to use a man on a locomotive on the strength of his own alleged ability; the boss should know definitely whether he is capable of filling the place.

FREDERICK NEUMAN.

Scranton, Pa.

Train a Capable Understudy For That Dangerous Haul

IS EVERYBODY working together? Are there enough mine cars to handle the tonnage? The number of cars should be sufficient to allow three trips to a motor on sub-haulage, one trip being loaded at the faces and one being on the sidetrack, while the third trip is in transit. Two trips should be provided for every main-line haulage locomotive, one being dumped while the other is in transit.

Is the tipple handling coal fast enough to keep the main haulage going? If so, is the main haulage keeping the sub-haulage supplied with empties and is it removing loads promptly? Where main haulage units are hauling from two or more sidetracks, is care taken to return only the number of empties equivalent to the number of loads taken on the preceding trip? On the answer to these and kindred questions concerning haulage, depend the possibility of stabilizing tonnage.

Extra men can be employed at the shaft bottom or at the side tracks, also as road and timbering helpers. In almost every mine some haul is more dangerous and requires more skill than others. In that case, it is well to train one or more of the most skilled motormen on a haul more dangerous than their own, putting them on the run for a day or two at a time and filling their places on the less dangerous runs by substitute motormen.

A. A. ALLAN.

Brownsville, Pa.

Competition for Haul Jobs Spurs Man to Do His Best

FORETHOUGHT in placing men in the different sections of a mine makes comparatively easy the solution of the problem presented by absentee motormen and others holding key positions. But careful planning is necessary, especially in small mines of from 500 to 1,000 tons' capacity, where the carrying of extra men on the payroll is impracticable.

Before permanently placing a man on a locomotive, it is well to check his record of attendance and general habits for the preceding year or two. If his record is good, all is well; if it is not, make a change quickly to a man with a record that meets your specifications. Place as trip riders, young men who are ambitious to become motormen and who have shown some aptitude for the work.

Both motorman and trip rider should be informed that the man riding the trip is an understudy of the man operating the locomotive. These two men should exchange places for at least one trip each day. This plan will put both men on their toes, for in all lines of endeavor there is no greater stimulus than the knowledge that some other fellow is itching to take your place. The thought that the understudy may make a better record than the regular is the greatest spur of all.

In every mine there are a number of young men at the coal face who are willing to fill in as trip riders. In order to hold them in reserve, these men should be given slightly preferential treatment in the matter of working conditions. And the boss should tell them what is expected of them.

In large mines, extra men sometimes are kept on the payroll and used in recovery work. Their employment in this capacity should not add to the running cost, for much of this kind of work has to be done anyway. Furthermore, recovery work usually is budgeted separately. The most dependable method of training men for haulage or any other important company job is to start them in the particular work when they first enter the mine as green hands, under the guidance of fairly seasoned and experienced men.

Panama, Ill. ALEXANDER BENNETT.

Publications Received

Electrical Motored Equipment: Approvals and Extensions, by L. C. Ilsley and M. W. Means. Bureau of Mines, Washington, D. C. Information Circular 6218; 5 pp.

Dynamites: Their Propulsive Strength, Rate of Detonation and Poisonous Gases Evolved, by N. A. Tolch and G. St. J. Perrott. Bureau of Mines, Washington, D. C. Report of Investigations 2975; 15 pp., charts.

Methods of Some Progressive Mining Companies in Placing Responsibility for Mine Accidents, by D. Harrington, C. W. Owings and F. E. Cash. Bureau of Mines, Washington, D. C. Information Circular 6211; 11 pp.

Permissible Explosives: A Study of Test Data, by G. St. J. Perrott and N. A. Tolch. Bureau of Mines, Washington, D. C. Report of Investigations 2976; 7 pp.

The Measurement of Air Quantities and Energy Losses in Mine Entries, Part IV, by Cloyde M. Smith. Bulletin No. 199; 50 pp., illustrated. Price, 30c. Engineering Experiment Station, University of Illinois, Urbana, Ill.

Coke as a Domestic Heating Fuel, by P. Nicholls and B. A. Landry. Bureau of Mines, Washington, D. C. Report of Investigations 2,980; 18 pp., illustrated.

Advanced Mine Rescue Training: Part I —Mine Gases and Methods for Their Detection, by J. J. Forbes and G. W. Grove. Bureau of Mines, Washington, D. C. Miners' Circular 33; 65 pp., illustrated; price 20c.

Coal-Dust Explosibility Factors Indicated by Experimental Mine Investigations 1911 to 1929, by George S. Rice and H. P. Greenwald. Bureau of Mines, Washington, D. C. Technical Paper 464; 45 pp., illustrated; price, 10c.

Bureau of Mines Instruction in First Aid and Value of 100 Per Cent First-Aid Training to Employees of Mining and Oil Companies, by A. L. Murray. Bureau of Mines, Washington, D. C. Information Circular 6,217; 32 pp.

Rock-Dust Barriers for Coal Mines, by G. S. Rice, H. P. Greenwald and H. C. Howarth. Bureau of Mines, Washington, D. C. Report of Investigations 2,977; 14 pp., illustrated.

Trade Standards Adopted by the Compressed Air Society. Fourth Edition. Pp. 47, illustrated; price, 50c. Compressed Air Society, New York City.

Lighting Fuse—Some Aids for Performing an Operation That is Not as Simple as it Looks, by E. P. Griswold. Explosives Service bulletin of the E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

Proceedings of the 32nd Annual Meeting of the American Society for Testing Materials. 1,016 pp. Prices, $6 in paper, $6.50 in cloth and $8 in half-leather binding.

"Advanced Mine Rescue Training," by J. J. Forbes and G. W. Grove. Bureau of Mines, Washington, D. C. Miners' Circular 36, Part IV; pp. 54; illustrated. Price, 15c. Discusses organization, equipment and materials, and procedure in fighting, sealing and unsealing mine fires and in recovery operations following explosions.

"Permissible Junction Boxes," by L. C. Ilsley and R. A. Kearns. Bureau of Mines, Washington, D. C. Technical Paper 454; pp. 19; illustrated. Price, 10c. Covers the function of and need for junction boxes, results of investigations and tests.

"Tests of Strength of Roof Supports Used in Anthracite Mines of Pennsylvania," by George S. Rice. Bureau of Mines, Washington, D. C. Bulletin 303; pp. 44; illustrated. Price, 15c. Report of the U. S. Bureau of Mines to the Pennsylvania State Anthracite Mine Cave Commission, and review of the compressive strength of anthracite, bituminous coal and mine supports.

"Composition of Tar From Low-Temperature Carbonization of Utah Coal"—II, by R. L. Brown and R. N. Pollock. Mining and Metallurgical Investigations Under the Auspices of U. S. Bureau of Mines, Carnegie Institute of Technology and Mining and Metallurgical Advisory Boards. Co-operative Bulletin 41; pp. 13; illustrated. Price, 15c. Carnegie Institute of Technology, Pittsburgh, Pa. This is the third in a series of co-operative studies of the composition of tars from Mesa Verde (Utah) coal when carbonized with steam superheated to about 700 deg. C.

Employment of a Motor Boss Will Iron Out Troubles

MAC AND JIM are in need of some good advice on conducting their haulage system if they permit motormen to remain away from work frequently. The answer to their problem is the discharge of delinquent motormen. The employment of a capable haul or motor boss who has had the practical experience of a motorman and brakeman will help the situation a great deal.

A good plan is to allow the brakeman to handle the locomotive control during one or two trips each day, with the regular motorman doing the braking for him. Then every locomotive will have an extra motorman. Green men serve better as brakemen than as motormen. If a new man applies for a job as a motorman and meets your specifications, give him a job as a day man with the promise that he will be given the first opening in the ranks of the brakemen. Motorman vacancies should be filled by brakemen and not by new motormen.

If a regular motorman desires a change of job and wants to work as a trackman, loader, or timberman, transfer him to the work he wants, but let him understand that he will be expected to fill his old job temporarily on those days that the man who takes his place does not appear for work.

VICTOR G. GANDY.

Hepzibah, W. Va.

Practice Line Promotion In Filling Motorman Vacancies

I MAKE IT a practice to promote my brakemen to motormen. Then a man who starts out as a brakeman knows he will have a chance to run a motor when his turn comes. Brakemen should be trained to handle a motor by gathering a trip, every once in a while, when the crew is on time or ahead of scheduled time. If a brakeman has proved that he cannot operate a motor, I get rid of him, even though he is a fairly good brakeman, because he interferes with my line-promotion plan for training men.

J. A. COSGROVE.

Westernport, Md.

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Shall We Scrap Men at 45?

No problem in recent months has roused more interest than the question of age-hiring limits raised in the January issue. Letters discussing this problem continue to come in. Some of the recent typical replies appear below.

Old-Man Values Proved in An Actual Comparison

ALMOST any job in a coal mine, with the exception of haulage, will be done better by older men. Braking is a young man's job, but should be planned and supervised by older men. Young men have a place, but, as a class, they are less reliable than their fathers. What they gain in speed, they lose in poor judgment.

There is a place for men of all ages in coal mining, a fact I learned at an early age when placed in charge of a large mine. This mine was a sort of poor farm, a place for miners who had grown old at other mines of the company. It was highly gaseous and strongly unionized, a condition which made it no easy matter to change a man from one job to another.

Being old, the workers at this mine were looked upon as a burden. But it was soon learned that while we needed more young blood, we were blessed with the sound judgment of the older men. It wasn't long until we had found a place for every old man where he could turn out good work. A number of these old men had been spoiled, but most of them were not only capable but willing to carry out properly planned work.

In order to build up a reserve of young men for haulage jobs and shape a better balanced organization, plans were laid as follows:

Four old men with foreman experience were chosen as assistant foremen. The company placed these men under me to insure against those errors which men of my age are sure to make if not guided by older men. Today I look back with gratification on this experience. I thought my assistants were hard nuts and against me, but I soon learned my mistake. Anything I could sell those four old-timers was good; it had to be, or they would reject it.

A few old men asked to be changed from company work to loading coal. We gave them the best available places in the mine. Jobs of trackmen, timbermen, brattice men, pillar men, drillers, and cutters were filled by old men, who were assigned young men as helpers. This plan placed old men where they were needed and gave us a reserve of young men for our haulage system. The whole plan resulted in a substantial increase in tonnage and reduced our accidents nearly 50 per cent.

GEORGE EDWARDS.

Paintsville, Ky.

Brains Vs. Old Age

THE OLD MAN'S idea of not employing any workers over 45 years of age is all wrong, looking at it from a practical point of view. It is true that men beyond this age are more likely to encounter permanent disability or death in an accident than younger men, but their experience will offset that disadvantage. In the mine where I am employed, men of 55 are doing the same work, both in quality and quantity, that the men of 20 to 30 are doing. We have several men aged 50 to 60 who compare favorably with any young man on the job. The answer to the question lies in employing mine officials who are broad-minded enough to hire men on the basis of ability and not of age.

Avella, Pa. J. M. STIDHAM.

Young Men Are Responsible For High Labor Turnover

IN SOME ways young men are better than old men, but it should not be forgotten that youngsters are reckless and inclined to change jobs frequently, shifting from mine to mine. They are largely responsible for higher labor turnovers and for the consequent instability of production and costs. Mac and Jim are doing right in sticking to the older men.

CAL DIXON.

Pruden, Tenn.

Men of Experience Needed For Smooth Mine Operation

ALWAYS consider ability before age. This statement is founded on experience of about twenty years in coal mines, as tracklayer, motorman, brattice man, machine runner and, in fact, almost every job in the mines, including fireboss, assistant foreman, foreman, and superintendent. When in doubt about a man because of his age, consider ability due to age, remembering it takes the man with experience to make the wheels turn smoothly. I have had many men in my charge who were past 45 and some who were past 50. They had the knack of going right along

Training Men

The training of men stands high above all other problems in production today. Machines and men have been bettered at a satisfactory rate, but improvement in machine runners and other attendants has not kept pace, it is felt. Much remains to be done in this field of endeavor, and officials who contemplate the launching of a training program would do well to follow these pages more closely than ever before, for training of men is being emphasized in this department. Send in your answers to the current problem today. If you have a problem needing solution, send it too.

with the work assigned to them and they worked efficiently because their minds were on their duties. Young men frequently work mechanically while their minds wander to thoughts of other things.

Efficiency comes from putting the right man in the right place. You would not put a man of 55 to braking, or a youngster of 18 to running a hoisting engine. A mine employing a large number of men will not get results if all the workers are past 45, nor will it get results from an organization of young men. Men of experience are needed to train and guide the younger men in the performance of their duties. Any man who has mined coal for twenty years must have some degree of ability or he could not have kept a mining job that long. If he continues to earn his salt, keep him on, regardless of his age.

Indianola, Pa. J. T. CRAWFORD,
Mine Foreman.

If Age Limit Is Established, Youth Will Not Mine Coal

IF MINERS are thrown out of work at 45, what will the coal business have to offer the young man? It is certain he will not start on a job from which he will be automatically severed when he reaches his prime. At the age of 45, he will have worked about 25 years in the mines, and though in full health and energetic, he will hardly be fitted for an outside job, having become used to the uniform temperature prevailing underground.

Enforcement of this regulation will eventually lower the standard of man power and cut the profits of companies in coal mining. Most companies require a physical examination, and if a man is sound physically, he should be given a chance to work. Look over your list of tracklayers, brattice men, firebosses, and timbermen. Determine how many of them are under 45, and see how many can be replaced by younger men in whom full confidence can be placed. When you strike off your list men over 45 years of age, you remove the steadiest and most loyal workers and sacrifice the brains of your organization.

C. E. MONTGOMERY.
Edwight, W. Va.

Compensation Law Needs Fixing

WHAT is to be done with an old man in mining is a difficult problem to solve. It doesn't seem quite fair to throw a man out of a job when he has spent his life at it and given his best years to it. The problem is much more easily solved in non-union fields, for there the company can pick a job that the old man can handle and pay him according to the amount of work he is able to perform. In the union fields at the present time the establishment of a sliding scale of wage payment is impossible, and the union officers would do well to work out some plan for payment along this line.

The one thing that needs attention most is the compensation law. Under the present law, of course, if an old man is killed it costs the company just as much as it would if the man had been young and had the greatest part of his life in front of him. The risk on an old man is greater, because he is less active than the young man.

Personally, I do not consider a man as being too old for work at the age of 45. However, the company does lose money on an old man after he gets to the place where he is not able to do a day's work. If he is given a job loading coal, the company is put to a disadvantage in trying to maintain uniform progress in the advance of all places. Where the mine is worked on a panel system, the company starts all the rooms in a panel at the same time and tries to work them together, so that no delay need be incurred in pulling out materials and moving them to another panel.

R. A. BARTLETT,
Eldorado, Ill. Mine Manager.

Recent Patents

Plant for Washing Coal and Other Minerals by Means of Liquid Streams; 1,731,410. Antoine France, Liége, Belgium. Oct. 15, 1929. Filed Aug. 27, 1926; serial No. 131,919.

Conveying Mechanism; 1,732,365. Robert K. Jeffrey, Columbus, Ohio, assignor to Jeffrey Mfg. Co., Columbus, Ohio. Oct. 22, 1929. Filed Dec. 30, 1927; serial No. 243,622.

Miner's Fuse Pliers; 1,732,676. John F. Erbele, Beulah, N. D. Oct. 22, 1929. Filed Oct. 2, 1928; serial No. 309,783.

Trackless Mine Motor; 1,733,526. William H. Coburn and Charles Kiernan, Morgantown, W. Va. Oct. 29, 1929. Filed Feb. 24, 1928; serial No. 256,665.

Process and Apparatus for Drying and Pulverizing Coal; 1,734,992. Frederic I. Barrows, Indianapolis, Ind. Nov. 12, 1929. Filed July 18, 1927; serial No. 206,418.

Car Cager; 1,735,777. Glenn W. Merritt, Bowerston, Ohio, assignor to Mining Safety Device Co., Bowerston, Ohio. Nov. 12, 1929. Filed Aug. 3, 1928; serial No. 297,140.

Rotary Car Dump; 1,735,778. Glenn W. Merritt, Bowerston, Ohio, assignor to Mining Safety Device Co., Bowerston, Ohio. Nov. 12, 1929. Filed Dec. 15, 1928; serial No. 326,228.

Mine-Ventilating System; 1,735,927. Louis Kessler, Chicago. Nov. 19, 1929. Filed Oct. 24, 1927; serial No. 228,161.

Separation of Minerals and Other Substances; 1,736,111. Thomas M. Davidson, Hatch End, Middlesex, England. Nov. 19, 1929. Filed Sept. 14, 1926; serial No. 135,454.

Tooth for Crushing Rolls; 1,736,563. George W. Wilmot, Hazleton, Pa., assignor to Wilmot Engineering Co., Hazleton, Pa. Nov. 19, 1929. Filed March 26, 1927; serial No. 178,555.

Mining Machine; 1,736,853. Dudley T. Fisher, Columbus, Ohio, assignor to Jeffrey Mfg. Co., Columbus, Ohio. Nov. 26, 1929. Filed March 8, 1924; serial No. 1,736,853.

Electric Mine Lamp; 1,736,997. Jules G. Daloz, Courbevoie, France. Nov. 26, 1929. Filed June 11, 1926; serial No. 115,172.

End Gate or Extension for Mine Cars; 1,737,060. John Ruffing, Sr., Nokomis, Ill. Nov. 26, 1929. Filed Feb. 14, 1926; serial No. 1,737,060.

Coal Separating Apparatus; 1,737,410. Edward J. Corcoran, Plains, Pa. Nov. 26, 1929. Filed Sept. 27, 1928; serial No. 308,651.

Signal for Mines; 1,737,514. Mike Nikolish, Williamson, Iowa. Nov. 26, 1929. Filed April 1, 1929; serial No. 351,664.

Coal Pulverizer; 1,737,931. Frank G. Lugrin, Moose Jaw, Sask., Canada. Dec. 3, 1929. Filed Jan. 5, 1928; serial No. 244,742.

Blasting Cartridge; 1,738,920. Erle Ormsby, St. Louis, Mo., assignor to Central Mine Equipment Co., St. Louis, Mo. Dec. 10, 1929. Filed July 5, 1927; serial No. 203,420.

Power Shovel; 1,739,175. H. L. Mitchell and R. Ljungkull, Milwaukee, Wis., assignors to Harnischfeger Corporation, Milwaukee, Wis. Dec. 10, 1929. Filed April 16, 1926; serial No. 102,397.

Disintegrating and Conveying Machine; 1,739,215. Kenneth Davis, St. Benedict, Pa., assignor to Rembrandt Peale, St. Benedict, Pa. Dec. 10, 1929. Filed May 12, 1923; serial No. 638,486.

Trade Literature

Rotary Railroad Car Dumper. Link-Belt Co., Chicago. Book No. 1,004; 8 pp.

General Electric Co., Schenectady, N. Y., has recently issued the following: Mesh-belt Conveyor Furnace; GEA-1174A. Constant-Potential Arc-Welding Sets; GEA-569C. CR2922-B1 Pressure Governor; GEA-1,162. CR7764-C1 and CR7765-B1 Controllers (for wound rotor, a-c. induction motors) GEA-834A. Automatic Welding Head and Control (automatic electrode-feeding device—magnetic clutch type) GEA-556C. Cartridge Type Electric Heating Units; GEA-104A. Mine Locomotives—Trolley Type, Gathering. GEA-70A. These are all 4-pp., illustrated.

Double Crimped Wire Cloth and Woven Wire Screens. Ludlow-Saylor Wire Co., St. Louis, Mo. Pp. 36, illustrated.

Arc Welding of Pipe Lines. Lincoln Electric Co., Cleveland, Ohio. Pp. 12; illustrated.

Chain Hoist. Ford Chain Block Co., Philadelphia, Pa.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has recently issued the following: Type H Busbar Supports, circular 1825; 28 pp., illustrated; describing line of standard duty and heavy duty busbar supports. Detachable Watthour Meters, Type OB, for indoor and outdoor use, described in Leaflet No. 20,433. Outdoor Switchhouses, circular 1861; 8pp., illustrated.

Improved Generating Sets for Stationary Service, Direct Current, Two or Three Wire. Troy Engine & Machine Co., Engberg Division, St. Joseph, Mich. Bulletin 106; 15 pp.

Roller Chain Data Book, No. 1257, 96 pp., illustrated, has been issued by the Link-Belt Co., Indianapolis, Ind.

Machine and Belt Guards. Harrington & King Perforating Co., New York City. Pp. 16; illustrated. Describes perforated machine and belt guard accessories, including perforated bands, angles and gussets, also detachable floor posts and sockets.

VM-Type Boilers (Bent Tube). Combustion Engineering Corporation, New York City. Bulletin BVM-1.

Fabrication of Welded Piping Designs. Linde Air Products Co., New York City. Pp. 86; illustrated. Contains procedure to be followed in making welded line joints and fittings. Tables for estimating costs are also included.

Modern Mechanical Drying. Koppers-Rhéolaveur Co., Pittsburgh, Pa. Pp. 23; illustrated. Describes the application, construction, installation, design and operation of the Carpenter centrifugal drier.

Type 30 Air Compressors. Ingersoll-Rand Co., New York City. Pp. 11; illustrated. Describes this type of two-stage, air-cooled, ball-bearing compressors.

Vertical Simplex Air Compressors, Type P6. Chicago Pneumatic Tool Co., New York City. Bulletin 788 (second edition); 7 pp., illustrated.

Synchronous Motors in the Mining Industry. General Electric Co., Schenectady, N. Y. GEA-1171; 4-pp. folder, illustrated, describing their various applications on motor generator sets, for driving air compressors, mine fans and pumps.

Outdoor Apparatus Insulators. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Circular 1858; 20 pp., illustrated.

AMONG THE MANUFACTURERS

WEST COAST WOOD PRESERVING CO., Seattle, Wash., recently incorporated to operate wood-preserving plants, has leased the timber treating plants of the J. M. Colman Co. and the Pacific Creosoting Co., both located in the vicinity of Seattle, and will operate them as a consolidated property.

* * *

ATLAS CAR & MFG. CO., Cleveland, Ohio, has appointed Goggin & Mills as Chicago representatives for the sale of its products.

* * *

JOSEPH T. RYERSON & SON, INC. have completed a new building at Detroit, Mich., for storing and dispatching their line of high-grade steels.

* * *

CHARLES A. HAYNES, for the past five years an executive of the Truscon Steel Co., Youngstown, Ohio, has been made manager of the transmission structures division.

* * *

J. V. SANTRY, former president of the Combustion Engineering Corporation, New York City, has been appointed head of the organization by Wilfred R. Wood and the Irving Trust Co., receivers. JAMES CLEARY, formerly Western manager, has been made general sales manager, with headquarters in New York City.

* * *

OHIO BRASS CO., Mansfield, Ohio, has opened a branch office in Seattle, Wash., to better service its products in the Northwest.

* * *

E. H. CLARK, formerly with the Electric Appliance Co., has joined the sales force of the Rockbestos Products Corporation, New Haven, Conn., and will make his headquarters at the Chicago district office. The Rockbestos company also has opened a branch office at St. Louis, Mo.

* * *

J. H. BELKNAP, section engineer in charge of customers' service, has been made manager of the control engineering department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., succeeding E. B. NEWILL, who resigned to become assistant to the president of the Delco Products Co.

LINK-BELT CO., Chicago, has opened a branch office at Vancouver, B. C., to supplement the service rendered by the official distributors of Link-Belt material in the Pacific Northwest.

* * *

M. W. SEYMOUR, formerly connected with the Bethlehem (Pa.) works of the Roller-Smith Co., has been transferred to the New York City office as sales engineer. H. D. STIER, Atlanta, Ga., has been appointed the company's representative in Alabama, Georgia, and North and South Carolina, and the H. N. MULLER CO., Pittsburgh, Pa., will have charge of the western Pennsylvania, West Virginia and Youngstown (Ohio) districts.

* * *

ROOT, NEAL & CO., Buffalo, N. Y., will handle the products of the Falk Corporation in that section. In the Youngstown (Ohio) district, the YOUNGSTOWN STEEL SALES, INC., will represent the Falk company.

* * *

CHANGES announced by the Yale & Towne Mfg. Co. are as follows: E. C. WALDVOGEL, vice-president in charge of sales, will retire on April 1; WALTER B. DODGE, assistant to the vice-president in charge of sales, has been made manager of all Stamford hardware sales, and JAMES C. MORGAN takes complete charge of all materials handling equipment sales. The Philadelphia (Pa.) branch of the Yales & Towne company has completed the new plant of the Stuebing hand lift truck manufacturing division, which will be in charge of T. T. LUDLUM, formerly of the Holyoke (Mass.) branch.

* * *

MAJOR E. R. ELAM, salesman for the Wagner Electric Corporation in the St. Louis (Mo.) territory, has been made branch manager at Minneapolis, Minn. L. J. DICIANNE has been transferred to the Kansas City (Mo.) office.

* * *

H. K. PORTER, assistant general sales manager, has been made general sales manager of the Hyatt Roller Bearing Co., Newark, N. J., succeeding H. O. K. MEISTER, promoted to assistant general manager.

T. H. DRISCOLL, of the Chicago office of the Gardner-Denver Co., has been transferred to Los Angeles, Calif., and FRED V. MOORE, who has been covering the Eastern states, has been moved to Phoenix, Ariz. R. J. FEATHERSTONE has been assigned to the New York City office, in charge of rock-drill division products. IAN DUNCAN, Edinburgh, Scotland, after preliminary training in America, will represent the company in the London office of Gardner-Denver, Ltd.

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ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has established a sales office at Chattanooga, Tenn., to serve more effectively customers in eastern and central Tennessee.

* * *

STUART M. CROCKER, assistant to the president of the International General Electric Co., has been elected a vice-president of the organization, with headquarters in New York City.

* * *

GEORGE M. VERITY, president of the American Rolling Mill Co., Middletown, Ohio, has been elected to the newly created office of chairman of the board. JOSEPH H. FRANTZ, first vice-president, was elected vice-chairman. CHARLES R. HOOK, vice-president and general manager, succeeds to the presidency, and will retain his duties as general manager. In addition, CALVIN VERITY, treasurer and assistant general manager, was named vice-president and assistant general manager; S. R. RECTANUS, assistant to Calvin Verity, was made vice-president in charge of operations; C. W. DAVIS, assistant treasurer, was promoted to treasurer, and E. N. MILLAN, chief of construction, was made chief engineer.

* * *

WORTHINGTON PUMP & MACHINERY CORPORATION, New York City, has formed the Worthington Machinery Corporation of California, Ltd., to take over the sales and engineering staff and the warehouse facilities of the Worthington Co., Inc., in the state of California. Headquarters of the new company will be in Los Angeles and San Francisco, Calif., and H. D. CORNELL, president, Worthington Machinery Corporation of Oklahoma, and GEORGE W. HAWKINS, director of sales for the parent company, will go to California as president and vice-president, respectively.

* * *

H. R. BRILL, formerly with the Ottumwa Iron Works, Ottumwa, Iowa, has joined the Duncan Foundry & Machine Works, Inc., Alton, Ill., as sales engineer.

WHAT'S NEW
IN COAL-MINING EQUIPMENT

Mine Trolley Frog Designed For Heavy Wires

The Ohio Brass Co., Mansfield, Ohio, has developed the new Type PC mine trolley frog to meet the demand for one which will take the increasingly popular 6-0 trolley wire without the necessity of bending the wire when frog and cam tips are installed. The device

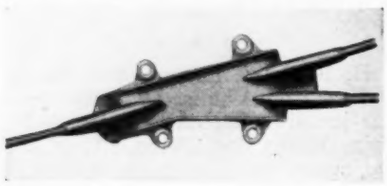
Incandescent Headlight for Locomotives

is so shaped, the company states, that the large wires lie in grooves without bending or preforming. Tightening the clamps is all that is necessary, it is said, to put the slight curve required in the wire.

In addition, the maker states, the tips are so formed that the current collector rides in and out of the frog smoothly without the necessity of peening the wire around the tips, simplifying the installation and eliminating impairment from careless or negligent application. The new frog may be obtained with either a bronze body or one of "Flecto" malleable iron, hot-dip galvanized. In both models, the clamping pieces are of galvanized iron. The frog may be obtained with a 15-deg. turnout, either right or left.

Another new product offered by the Ohio Brass Co. is an incandescent headlight, Type MS. Increase in mechanization, the company says, has brought in its train improvement in the power supply until current on the haulageways is now largely free from extreme fluctuations. This allows the high brilliance necessary on haulage locomotive headlights to be obtained with an incandescent lamp, rather than the former arc light, which was not greatly affected by voltage fluctuation. Consequently, incandescent lamps are incorporated in the new MS headlight and, where the voltage is uniform, the company claims that the light emitted is in every way the equal of that generated by arc lights, without the cost of upkeep and trouble typical of the latter.

Ohio Brass Frog for Heavy Wire

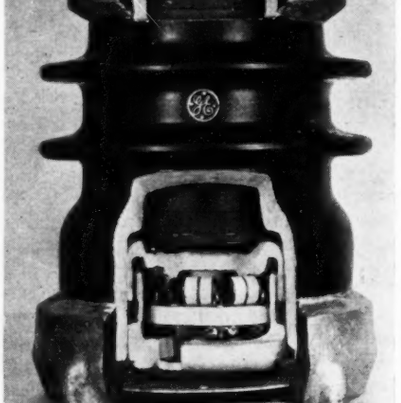


Electrical Products Offered

Small voltmeters and milliammeters, in 2¼- and 3-in. cases, for use on both alternating- and direct-current lines, have been introduced by the General Electric Co., Schenectady, N. Y. The instruments, according to the company, have molded compound bases and cases, the cases being threaded to screw on the base. The instruments, of the D'Arsonval type, are small and are equipped with full-wave, copper oxide rectifiers mounted within the case. The rectifiers, the company says, permit the instruments to be used on alternating-current circuits and make it possible to provide them in low voltage and current ratings with the high sensitivity, low power consumption and damping of the D'Arsonval element.

Voltmeters are available in ratings from 2 to 150 volts, and the milliammeters in ratings from 0.5 to 15 milliamperes. The panel-type instrument in a 3-in. case is designated as Type DO-14X; the one in the 2¼-in. case as Type DW-1X. A portable voltmeter, similar to the Type DW-1X but with a rectangular sub-base, double range, 10/500-volt scale, and a knob for adjusting it to read either alternating or direct current, is designated Type DW-2X. The manufacturer recommends the instruments for applications, including telephone and radio work, where the power for operating the instruments is very small.

An entirely new type of material that is both a good insulator and a good conductor of electricity has been developed by the General Electric Co. This material, called Thyrite, has the property, the company asserts, of changing its resistance to the flow of electricity as the voltage is changed. This change in resistance is such that each time the applied voltage is doubled, the resistance decreases, so that the current flow is increased twelve times. Unlike other insulating material, it is asserted



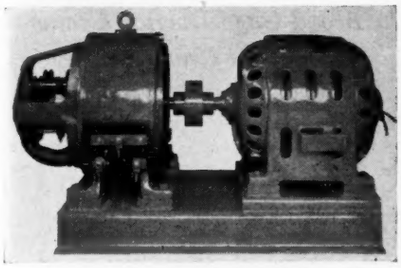
Cross-Section of Thyrite Lightning Arrester, Showing Arrangement of the Interior

that Thyrite changes its resistance as quickly as the applied voltage changes.

Thyrite, the company says, is similar to dry-process porcelain in mechanical properties and its electrical characteristics are permanent. It is possible, according to the maker, to use the material successfully on any alternating- or direct-current circuit. In connection with lightning arresters, the use of Thyrite is said to reduce considerably the space they require and to allow their performance to be accurately calculated.

Welded Motor-Generator Bases Said to Keep Out Dirt

Bases for motor-generator sets constructed of heavy steel plate, electrically welded, have been adopted for the motor-generator sets of the Reliance Electric & Engineering Co., according to an announcement. Tops and ends of the base are said to be completely closed, so that no dirt can collect underneath. The pads upon which the motor and



Motor-Generator Set With Welded Steel Base

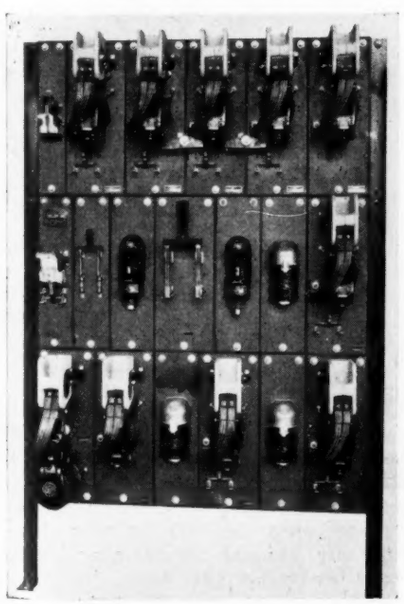
generator rest are lined up horizontally and vertically by using the machines as patterns, and such shims as are needed are placed between the pads and the base. Horizontal alignment is maintained by the use of tight-fitting dowels driven through diagonally opposite feet of the base of each unit into the pads. One or more units, the company says, may be removed from the base without worry about alignment when they are replaced.

Lowering Circuit Controller For Hoist Use

The Electric Controller & Mfg. Co., Cleveland, Ohio, now offers for use on crane, ore, and coal bridges, and bucket hoists, the "Wright" dynamic lowering circuit controller — magnetic contactor type. Dynamic braking hoist controllers formerly were open to the objection that the solenoid brake release was sluggish in the lowering direction, the company asserts, making it necessary for the operator to pause on the first controller point to give the brake a chance to release. Consequently, it is said, frequent adjustments were necessary to prevent entire failure of the brake to function. With the "Wright" controller, it is claimed, the brake releases instantly, the full line current passing through the brake, instead of only one-third on the first point lowering as in the older types of circuits. This improvement, it is asserted, insures faster crane movement; more accurate control of short, quick movements, and better ability to spot loads.

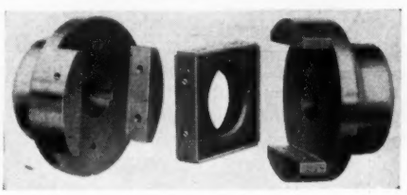
Other advantages mentioned by the makers are as follows: faster speeds when lowering light loads or an empty hook; greatly reduced power consumption with all loads at all speeds; greater power return to the line when lowering overhauling loads; reduced peaks; less heating of the motor; less contactor wear, and fewer movements when "inching" for accurate stopping of the load. All of these features may be obtained without the use of additional contactors, the manufacturer states.

"Wright" Dynamic Lowering Circuit Controller



Flexible Coupling Offered

The American Flexible Coupling Co., Erie, Pa., is now marketing a shaft coupling which, kinematically, is said to be a variation of the Oldham coupling in which a center member is constrained to slide across the face of one coupling flange on a line passing through the center and, at the same time, is free to slide across the face of a second flange at right angles to the first. The floating member of the coupling is a square, hollow casting with a hole in the center to provide clearance for the shaft ends. To the edges of this floating member are fastened replaceable bearing strips said to be made from a hard, tough, non-metallic compound.



American Flexible Coupling Disassembled

Flange sections, it is asserted, are identical and interchangeable, except for the bore diameters, which are made to suit the shaft. The flange is cast in one piece and a wide groove machined across the face, leaving two jaws between which the floating member slides and by which the torque is transmitted. The coupling, the maker states, can be removed without the use of special tools by pulling the jaw flanges apart horizontally or sliding them past each other vertically. Bearing strips may be replaced in a few minutes without disturbing the coupling or connecting shafts by removing the bearing strip screws through holes in the jaws and slipping out the old strips.

The floating hollow center is filled with grease, which passes to the surfaces of the wearing strips through channels furnished with wicks. Greasing is done by a grease gun through any one of the bearing strip screw holes. The manufacturer claims that the coupling provides maximum flexibility without the use of flexible materials; deterioration is slow when the device is subjected to moisture, heat and dirt; is convenient and accessible for replacement or repairs, cutting maintenance cost and losses in production time.

New Explosives Developed

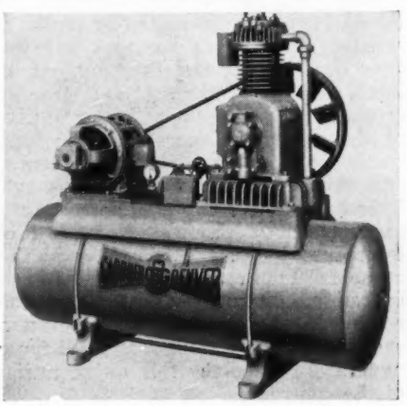
E. I. du Pont de Nemours & Co., Wilmington, Del., has developed two new, low-density, gelatin explosives, to be marketed under the names of Gelex No. 1 and Gelex No. 2. These new products are designed for use in ore mines, the company states, and also for the underground mining of limestone and other non-metallic minerals. Both Gelex No. 1 and No. 2 are said to be extremely cohesive and plastic, so that they load well in upward pointing holes.

Single-Stage Air Compressor Placed on the Market

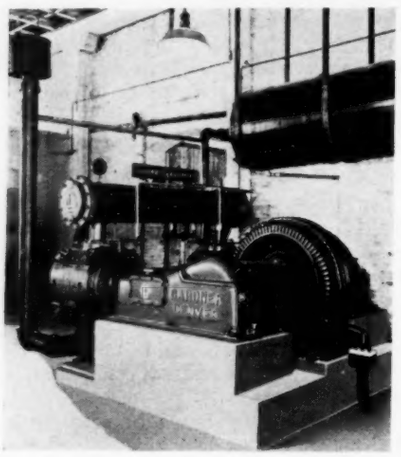
The Gardner-Denver Co., Quincy, Ill., has placed on the market a new air-cooled, single-stage compressor, designated as the A-C-E Model. It consists of a 3½x4-in. duplex compressor and a 5-hp. motor mounted on a cast-iron base on top of the air receiver. The unit, according to the company, has a displacement of 26 c.f.m., operating at 600 r.p.m. This rate, the company says, can be altered to meet particular conditions. Outstanding features mentioned by the company are as follows:

Suction and discharge valves—steel disks, heat-treated and ground—are placed in separate compartments, which prevents the air from becoming heated when passing through the intake valves. An automatic or hand-operated start and stop control is furnished as standard equipment and operates in conjunction with a Penn pressure and moisture unloader to insure continuous operation. Lubrication is accomplished by a con-

Gardner-Denver A-C-E Air Compressor



trolled splash system, the oil being circulated by a positive drive plunger pump, on the outside of the case. A special oil ring and groove prevent oil from passing over to the discharge line. Other construction features included are: V-belt drive; fan type fly wheel;



Synchronous Motor Driven Air Compressor

Hyatt roller bearings; aftercooler in the base and a muffler for the suction openings.

The Gardner-Denver Co., also offers a new line of duplex, two-stage, synchronous motor driven air compressors to complete its standard line of belt- and steam-driven machines. This compressor is of the heavy-duty type, with the motor placed between the two main bearings and mounted directly on the crankshaft. The main shaft is a solid steel forging, according to the company, and is oil-treated and annealed to insure maximum strength. Roller bearings are used for the main shaft, which the company maintains is a distinct advance in compressor design. Friction, it is claimed, is reduced to the lowest possible point, keeping the main shaft, connecting rods and cranks in alignment and increasing the life of the unit.

Low-Head Crane Controller Is Self-Contained

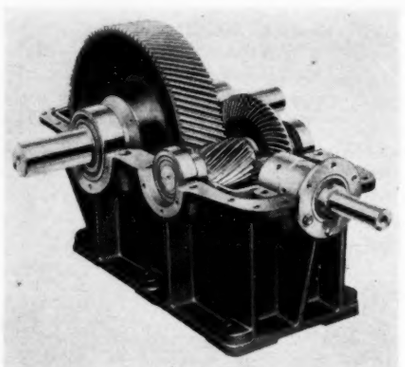
The General Electric Co., Schenectady, N. Y., has developed a self-contained, triple-drum controller with a resistor mounted in the back for the floor operation of the three motions of small, low-head cranes. The general construction is said to be similar to that of the standard General Electric line, with rope wheel having a spring return, and vertical or horizontal handles all interchangeable. The horizontal handle arrangement is provided in case it is desired to install the controller in the crane cab for the usual method of hand operation. In such an installation, the resistor can be separated from the drum switches, which is necessary if all three motors are rated the full 10-hp. rating of the controllers.

Metallic Hinge Pins for Use With Steel Belt Lacing

The Flexible Steel Lacing Co., Chicago, has developed new metallic hinge pins for use on the three smallest sizes of Alligator steel belt lacing. Previously, according to the company, these sizes of lacing have been joined with rawhide pins, which softened when wetted and wore under any conditions. The metal pins, the maker says, eliminate these troubles. Size 15 lacing now is offered with a sectional rocker pin, the same as that used on all the largest sizes, while the two smaller sizes have the new corrugated wire hinge.

New Right Angle Drive Offered Users

The Falk Corporation, Milwaukee, Wis., has brought a line of right-angle speed reducers to supplement its line of parallel shaft drives. This new series, the company says, has been developed to take care of a growing demand for right-angle drives on certain types of installations, and includes both horizontal and vertical type shafts. One feature of the right-angle drive is a combination of both helical and spiral bevel gears. It is pointed out that single helical gears for final reduction are easier to assemble than herringbone gears and their efficiency is practically the same. An accurately cut, single helical gear in combination with a high-grade, spiral bevel makes a quiet, cool-running reducer which has an efficiency of well over 95 per cent, the company says,



Falk Right Angle Drive-Speed Reducer

and this efficiency will be maintained over the life of the unit.

Another feature pointed out by the company is the reversible construction of the gears and shafts. If the gears become worn, the shafts can be turned end for end to permit using the unworn sides of the teeth. Lubrication is provided by a self-contained, continuous splash system. Ratings on the new line range from ⅛ hp. per 100 r.p.m. on the smallest unit to 565 hp. per 100 r.p.m. on the largest. Gear ratios range from 1.5:1 to 518:1.

Broad-Gage Derrick Crane Now in Production

A full-circle, long-boom, broad-gage crane-and-dragline, known as the "American Revolver," is now offered by the American Hoist & Derrick Co., St. Paul, Minn. The company says that its main features are a combination of those of both the derrick and the locomotive crane, which include: ability to handle heavy loads over a wide working radius; ease of movement on track or skid-and-rollers over rough ground; simplicity; all-steel construction; stability, and adaptation to all classes of heavy crane, derrick or dragline work.

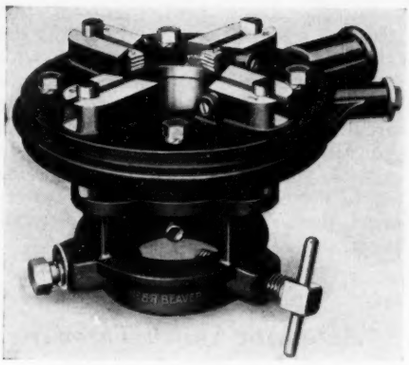
Three sizes, with booms 75, 85 or 100 ft. long and turntable diameters of either 14 or 20 ft., may be obtained. Mounting can be arranged to suit requirements, the company states, and the machine is available with either steam, electric, Diesel, or gasoline power.

Chromite Cement Developed

"Adachrome" plastic super-cement, a new high-temperature cement with a chromite ore base, is now offered by the Botfield Refractories Co., Philadelphia, Pa., for use in laying up fireclay, silica, chrome, high-alumina and, under some conditions, magnesite brick. Because of its chromite base, the company says that the cement is chemically inert, as well as hard, dense, and highly refractory. The maker claims, furthermore, that a bonding agent is employed which is efficient at very high temperatures and that the cement will resist the action of acid and basic slags, molten metal, abrasion and erosion, and chemical reaction resulting from the burning of acid sludge. In addition, when applied to boiler settings, the material is said to protect the brickwork from the penetrating action of clinkers and fusible coal ash. Other features pointed out by the company are as follows: the cement is sold in plastic form ready for use and is easy to handle and apply.

Die Stocks Use Separate Set Of Dies for Each Pipe Size

Beaver "Four-Poster" die stocks for threading 1-, 1¼-, 1½- and 2-in. pipe are now offered by the Borden Co., Warren, Ohio. According to the company, these tools use a separate set of dies for each size of pipe and instead of loose bushings offer the advantages of a self-contained rear end that is accurate and convenient to use. Other features noted by the company are as follows: "man's size" grip screw; grooved guide bolt and washer, allowing uniform thread-cutting; open die slots for easy cleaning; safe, inclosed, die-retaining device; extra-heavy upright posts, having a "standard-mark" near the top of each

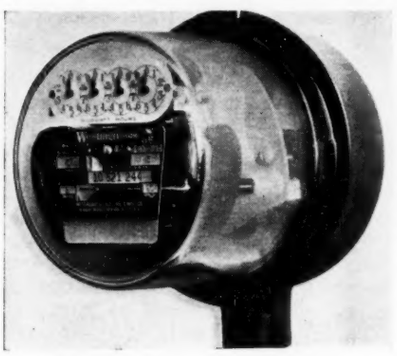


Beaver "Four-Poster" Die Stock

for convenience in cutting over- or under-size threads; light weight with strength, and a better ratchet pawl. No. 8 tool is plain, while No. 8R contains a ratchet.

Detachable Watthour Meter Is Weatherproof

Detachable watthour meters for use either indoors or outdoors have been developed by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and are now on the market. The instrument consists of the standard OB



Westinghouse Detachable Watthour Meter

watthour meter installed in a weatherproof case. The following advantages are claimed by the manufacturer: easy removal or installation by the use of plug terminals; suitability for mounting in any location, indoors or outdoors; reduction in labor, reading and testing costs; immunity against tampering by reason of ironclad construction; adjustability, which permits mounting with conduit entrance at top, bottom, right or left; particular adaptability to modern methods of conduit wiring.

Pintle Conveyor Chain Pin Changed in Design

A new type of conveyor or drag chain has been designed by the American Manganese Steel Co., Chicago Heights, Ill., for use in handling refuse or any other material to which this type of chain is applicable. The links are made of manganese steel, said by the company to give better wear and longer life, and, in addition, the design of the pin has been changed. In place of the usual steel pin or rivet running clear through the body of the link, each link of the new chain is supplied with two hollow manganese steel bushing pins, one for each eye of the link. These are held in place by the usual steel pin.

This bushing arrangement, the company says, enlarges the bearing surface and does away with the distortion

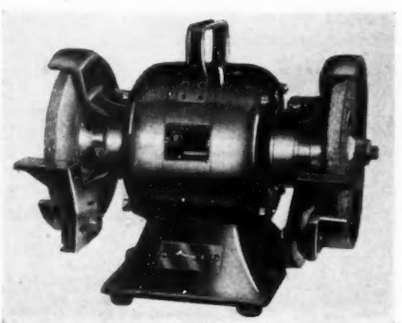
Construction Details, Composite Pintle Conveyor Chain

characterizing the regular steel pins, which is accompanied by elongation of the chain pitch and trouble in removing or replacing worn pins. Other advantages mentioned by the company are as follows: pintles do not bend or cut; pintles can be reversed to restore pitch; manganese steel gives longer life; pintles and rivets are easily replaced.

Electric Bench Grinder Is Portable

Black & Decker Mfg. Co., Towson, Md., is now offering a new 5-in., ball-bearing, portable, electric bench grinder. It is said to have been designed to meet the demand for a quality ball-bearing grinder within the price

Black & Decker Bench Grinder

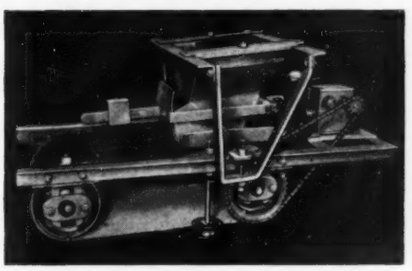


range of the 6- and 8-in. sleeve-bearing tools. Anti-friction bearings are relied upon to make it easier to maintain wheel speeds under load. The grinder may be obtained for use with alternating current only, maintaining spindle speeds of 3,600 and 3,000 r.p.m. on 60-cycle and 50-cycle current, respectively.

Feeder Regulates by Weight

The Hardinge Co., York, Pa., has developed a constant weight feeder for use primarily with ball, tube, or roll mills, which, it is stated, regulates both coarse and fine feeds by weight instead of volume. By its use, the company says, the weight of material fed into the mill is kept at a constant figure, regardless of the size of the feed, moisture content, or specific gravity of the materials being measured, thus keeping the mill operating at its maximum efficiency at all times.

The feeder, consisting of a traveling belt attached to a frame on which the driving mechanism also is located, is suspended on two pivoted points so that any variation in the weight will move the frame, which in turn moves the feed gate. A balancing weight controls the



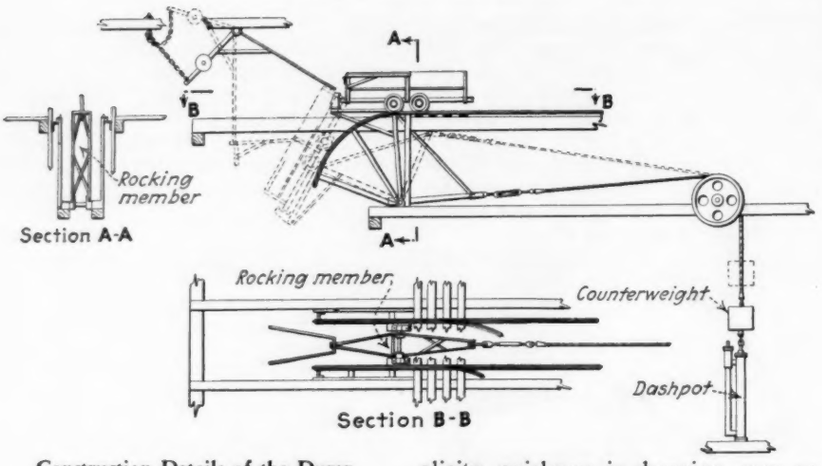
Hardinge Constant Weight Feeder

quantity of feed desired, and once set, the company claims that the machine will maintain a steady rate. A revolution counter makes it easy to record the total weight fed for any given time. Being a self-contained unit, the company asserts that it is only necessary to bolt the machine to the bin bottom and plug in the motor. Advantages claimed are: close regulation, cheapness, and ability, with two or more machines delivering to a common point, to make a mixture of accurate proportions.

Automatic End-Gate Car Dump Has New Features

A dump for end-gate cars, which stores sufficient energy while dumping a car to return it to the level and kick it back into the empty storage track has been developed by F. W. Deadrick, chief electrician, Bessemer Coal, Iron & Land Co., Wind Rock, Tenn. It is manufactured by D. T. Blakely, Evansville, Ind.

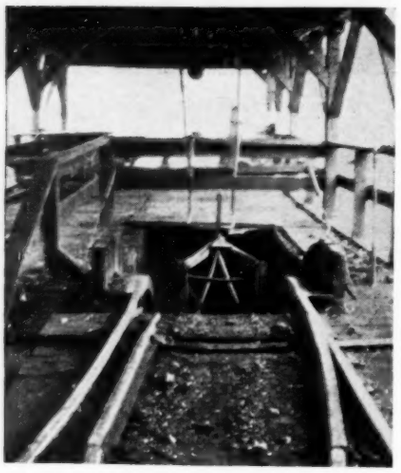
In operation, the car runs by gravity to the dump, where the bumper is



Construction Details of the Dump

caught by the hook of the rocking member (shown in the accompanying illustrations). The rocking member is rotated forward by the weight of the loaded car as it rolls down the circular track into the dump. The hook on the end-gate is engaged by a bridle, and the latter pulled open as the car descends. In rotating forward to the dumping position, the rocking member raises the counterweight, which, as soon as the car is emptied, pulls the member back to normal position and kicks the empty car back into the storage track.

The dashpot under the counterweight serves to cushion and check the movement of the rocking member at the end of its travel, and is equipped with a



Showing Rocking Member in Position to Receive Loaded Car

check valve to allow the counterweight and plunger to return freely to normal position. The speed of the loaded car in the dump is regulated by the dashpot and the speed with which the empty is returned by the weight of the counterweight.

It is said that the dump is very fast and will throw cars out as fast as the switching mechanism will permit. Other advantages claimed are as follows: simplicity, quickness in dumping, easy action on the car, and minimum breakage of the coal.

New Six-Cylinder Truck For Fast Delivery

The latest addition to the line of Mack Trucks, Inc., New York City, is the Model BG, a six-cylinder, 1½-ton truck for fast delivery service. It is available in three standard wheelbase

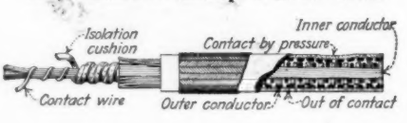
Model BG Fast Delivery Truck

lengths of 138, 158 and 168 in. and, according to the company, is adapted to a wide variety of bodies. Four standard bodies may be secured, which, it is stated, have been designed especially for the chassis. These are: platform body with removable rack sides; covered express body with side curtains; open express body, and a panel or closed body. In addition, the company says that bodies can be designed and furnished to meet any special requirements.

Remote Control Given By Contact Cable

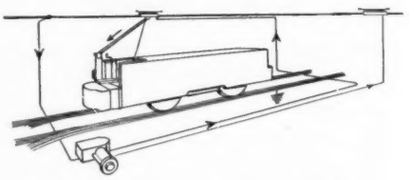
Bishop contact cable is offered by the Bishop Wire & Cable Corporation, New York City, as a means for remote control of electrical equipment. Its construction is such that wherever it is pressed, a signal is transmitted. Two conductors, inclosed by the outside insulation, are left bare but separated from each other by an "isolation cushion." Upon being pressed, this isolating cushion yields and permits the outer conductor to come in contact with a wire which is always in contact with the inner conductor, thus closing the circuit. Releasing the pressure allows the "isolation cushion" to return to normal, breaking the circuit. According to the company, the cable is waterproof, dustproof and can be made acidproof.

Construction of Bishop Contact Cable



Automatic Switch Thrower Electrically Operated

To replace the hand-operated switch, to eliminate danger, and to speed up haulage, the American Mine Door Co., Canton, Ohio, offers the Electri-Throw switch. This unit is electrically operated and employs the solenoid principle to move the switch points instantaneously toward one side of the track or the other. In operation, two contactors



Wiring Diagram for Electri-Throw Operation

are suspended above and clamped to the trolley wire about 150 ft. in advance of the switch points. One throws the points for the main line and the other for the sidetrack or turnout. When the locomotive passes a contactor, the trolley wire rolls off the wire onto a copper contact strip, completing the circuit through the Electri-Throw and moving the switch to the desired position.

To protect the coils of the solenoid from burning out, the company has provided an automatic cutout which, as soon as the switch points are thrown, cuts the current off the coils. According to the manufacturer, a contactor for hand operation may be obtained if conditions are not suitable for automatic operation. A lever is provided for hand operation when desired or when the occasion demands it.

Electri-Throw Contactor